FURUNO

INSTALLATION MANUAL

MARINE RADAR/ARPA

MODEL FAR/FR-2835S

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

9-52, Ashihara-cho,
Nishinomiya, Japan

Telephone: 0798-65-2111
Telefax: 0798-65-4200

•Your Local Agent/Dealer

FIRST EDITION : AUG. 1995
M : JUL. 3, 2001

PUB. No. IME-34070-M
FAR/FR-2835S

(TENI)

00080726800

⚠ SAFETY INSTRUCTIONS

⚠ DANGER

Do not work inside the equipment unless totally familiar with electrical circuits.

Hazardous voltage which will cause death or serious injury exists inside the equipment.

⚠ WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m^2 exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible—Ask your FURUNO representative or dealer to provide this feature.

⚠ WARNING

Turn off the radar power switch before servicing the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.

Prevent the potential risk of being struck by the rotating antenna and exposure to RF radiation hazard.

Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Turn off the power at the mains switchboard before beginning the installation. Post a sign near the switch to indicate it should not be turned on while the equipment is being installed.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the display unit.

Use the correct fuse.

Use of a wrong fuse can cause fire or equipment damage.

TABLE OF CONTENTS

LIST OF INSTALLATION MATERIALS, ACCESSORIES AND SPARE PARTS

OUTLINE DRAWINGS

SCHEMATIC DIAGRAMS

EQUIPMENT LISTS

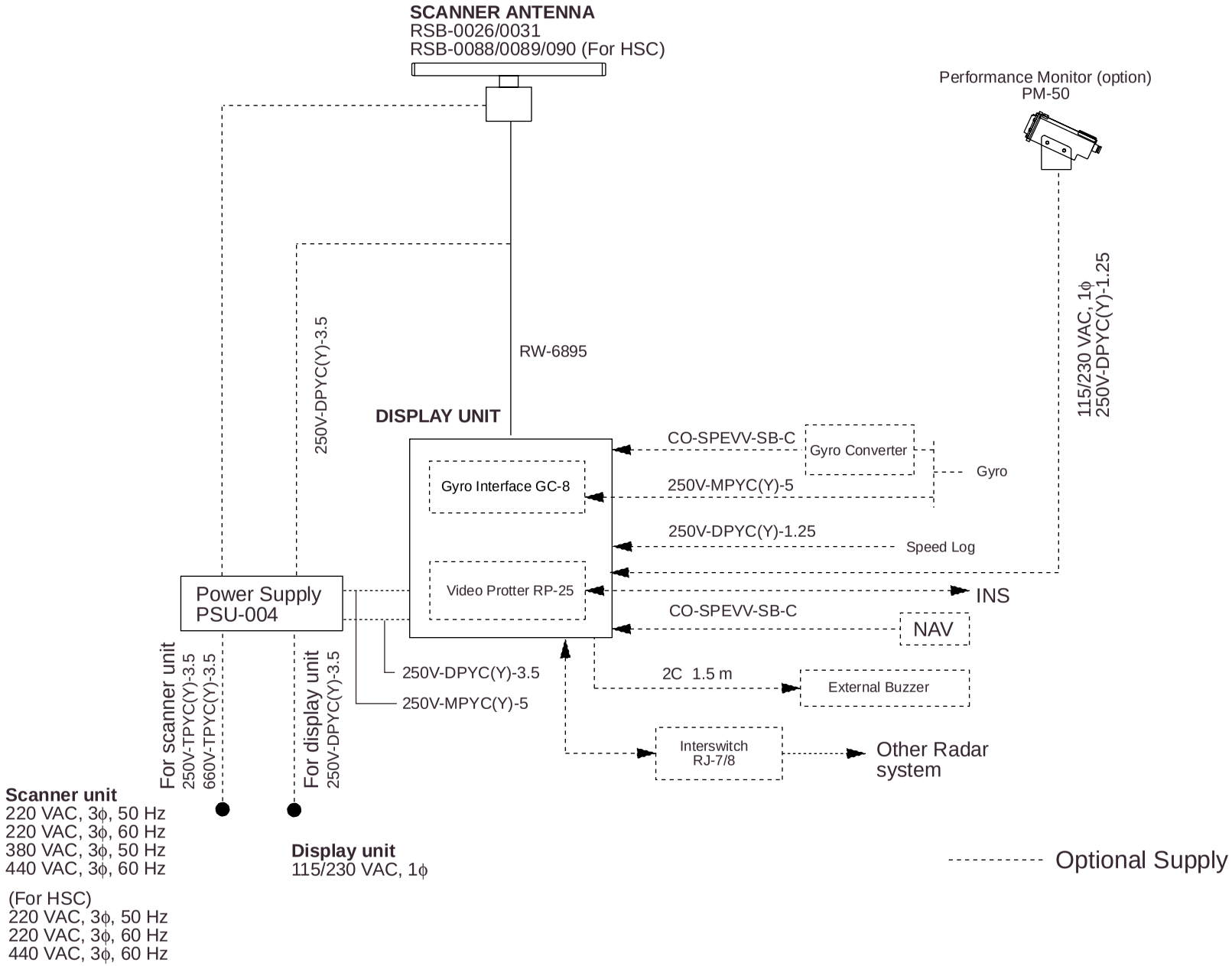
Complete set

No.	Name	Type	Qty	Remarks
1	Scanner unit	SN-36AF	1	Antenna radiator
		SN-30AF		
		RSB-0026	1	Scanner unit
		RSB-0031		
		RSB-0088		Scanner unit for HSC
		RSB-0089		
		RSB-0090		
2	Display unit	RDP-115	1	Pedestal mount type
				Tabletop type
3	Accessories	FP03-05710	1 set	For built-in control unit, FP-03-05701, FP-03-05704, FP-03-05705, 03-133-1811
		FP03-05730		For separate control unit, FP-03-05701, FP-03-05703, FP-03-05704, FP-03-05705, 03-133-1811
4	Installation materials	CP03-14603	1 set	For scanner unit
		CP03-14602	1 set	For display unit
		CP03-13907	1 set	For power supply unit
5	Signal cable	RW-6895 *15m*	1	
		RW-6895 *20m*		
		RW-6895 *30m*		
		RW-6895 *60m*		
6	Spare parts	SP03-11600	1 set	SP03-10320, SP03-11301
7	Power Supply Unit	PSU-004-70-23-S	1	3ø 200/200 VAC, 2.3A
		PSU-004-80-10-S		3ø 380/440 VAC, 1.0A

Optional equipment

No.	Name	Type	Code No.	Remarks
1	Hand grips	OP03-70	008-423-420	For display unit
2	M card fixing plate	OP03-133	008-452-400	
3	Hood	FP03-0574	008-459-810	
4	Display unit cover	OP03-126	008-459-820	Tabletop w/built-in control unit
		OP03-127	008-459-760	Tabletop w/separate control unit
		OP03-128	008-459-890	Pedestal mount
5	Display unit conversion kit	OP03-129-1	008-459-830	Converts from tabletop type/built-in control unit to pedestal mount
		OP03-129-2	008-452-410	
		OP03-130-1	008-459-900	Converts from tabletop type/separate control unit to pedestal mount
		OP03-130-2	008-452-430	
		OP03-131	008-459-910	Converts from pedestal mount to tabletop type/built-in control unit
		OP03-132-1	008-459-920	Converts from pedestal mount to tabletop type/separate control unit
		OP03-132-2	008-452-450	
6	Control panel fixing plate	OP03-134	008-461-340	For fastening separate type control unit to a tabletop
7	Video plotter	RP-25		
8	Gyro converter	GC-8-2	008-446-520	With installation materials
9	Interswitch	RJ-7		
10	External buzzer	OP03-21	000-030-097	1 m, with connector
11	Performance monitor	PM-50		
12	Range unit conversion kit	OP03-110-1	008-446-610	To km
13	Range unit conversion kit	OP03-110-2	008-452-200	To sm
14	Color display unit	CD-141		
15	Slave display unit	FMD-8000		
16	Transformer unit	RU-1758	000-030-416	Converts 220 VAC to 100 VAC
17	Transformer unit	RU-1803	000-030-420	Converts 440 VAC to 100 VAC
18	Interswitch	RJ-8		
19	Interface unit	IF-2300	000-002-422	

FR/FAR-2835S System Configuration



1. MOUNTIG

Note the following cautions before beginning work on the antenna unit.

1) To avoid as much as possible difficult and dangerous work atop the mast, the radiator should be assembled and fixed to the antenna unit and then raised to the mast. HOWEVER, NEVER LIFT THE ANTENNA UNIT BY THE RADIATOR. Antenna Unit lifting guidelines are shown on page 1-5.
2) Observe the antenna unit installation remarks on page 1-6.
3) Do not paint the radiator aperture.

1.1 Radiator Assembling Procedure

(Refer to page 1-2.)

1. Screw the guide pins into the radiator. (2 pcs.)
2. Remove the protection cap from the choke guide.
3. Apply grease to the O-rings and fit them in the grooves of the choke guide.
4. Place the radiator on the radiator bracket. (Radiator direction is shown by the label on the bracket. If reversely oriented, the radiator can not be fitted to the bracket.)
5. Loosely fix the radiator to the radiator bracket with hexagon bolts (M10 x 25), spring washers and flat washers.
6. Remove the guide pins and tighten hexagon bolts.

The antenna unit is normally mounted with the cable gland facing the ship's stern.

For perfect watertightness, O-rings must be fitted in the grooves of the choke guide as shown below.

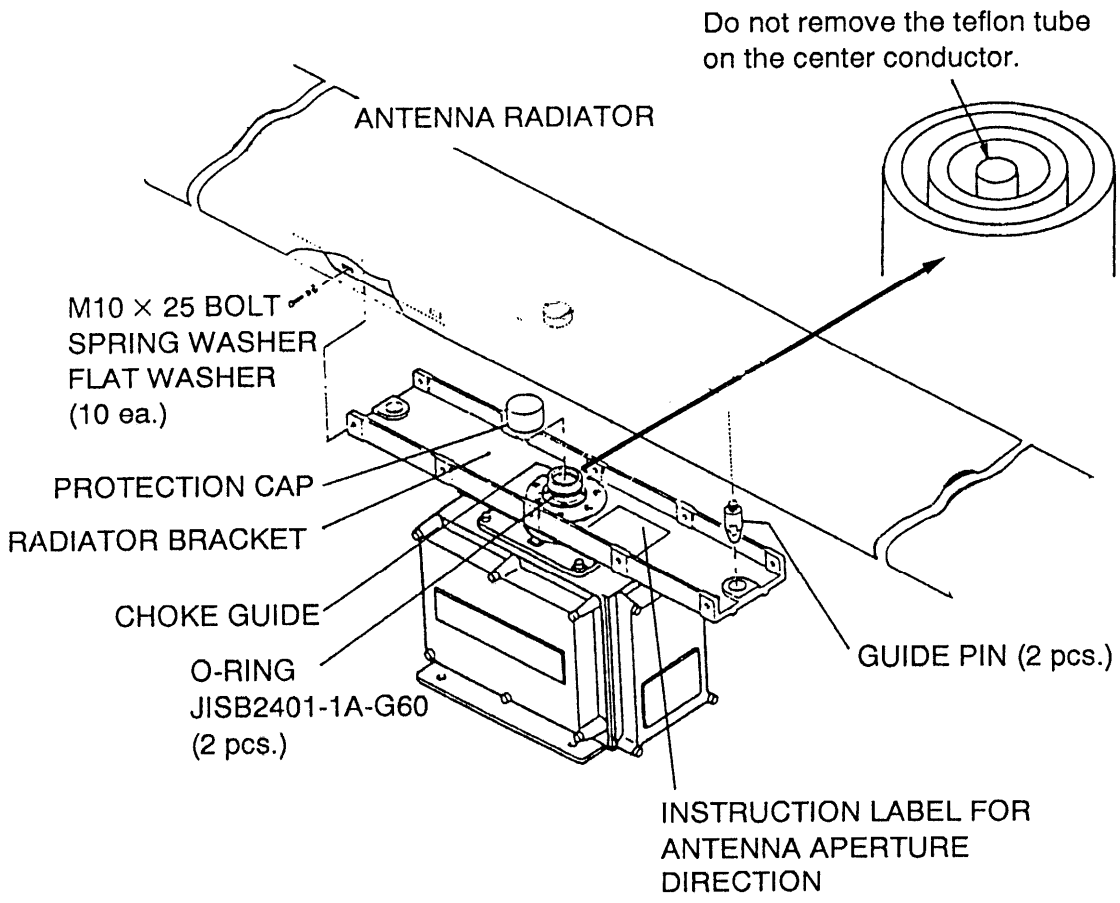


Fig. 1-1

> ***WARNING***
> Do not forget remove the guide pins. Serious bodily injury may result should they loosen and fall to the deck.

1.2 Mounting Structures

Mounting structures must be designed to provide sure support for the antenna unit and safe access for service personnel. More than the static weight of the antenna unit must be taken into consideration when designing the support structure to account for harmonic vibration and high acceleration forces generated under dynamic conditions. Mount the scanner unit directly on the mast or on the platform as near as possible to the center of the mast.

1.3 Mounting the Antenna Unit on the Mounting Platform

CAUTION

1) Work at high places is dangerous. Always wear a hard hat and safety belt when working on the antenna unit mast.
2) Both a service platform and steps to the service platform must be mounted to provide safe access for service personnel. Improperly installed platforms present a hazard to service personnel.

Siting considerations

CAUTION

A magnetic compass will be affected if placed too close to the antenna unit. Below are the minimum safe distances for magnetic cpmpassis.

Antenna	Standard Compass	Steering Compass
RSB-0026 RSB-0031	4.8 m	3.6 m
RSB-0088 RSB-0089 RSB-0090		

Consider the following points when selecting a mounting location for the antenna unit.

¥ No funnel, mast or derrick should be within the vertical, beam width of the antenna in the bow direction, especially zero degrees –5°, to prevent blind sectors and false echoes on the radar picture.
¥ Fumes from the funnel or other exhaust vent can adversely affect performance and hot gas can distort the radiator. The antenna unit must not be mouonted in a place where the temperture may exceed 70°C.
¥ Leave sufficient space around the unit for maintenance ans servicing. See the antenna unit outline drawing for recommended maintenance space.
¥ Locate the unit well away from the aerial of a radiotelephone or navigation receiver to prevent interference. Separation of more than two meters is recommended.

Antenna Unit Lifting Method

1) Fix the antenna radiator to the antenna base.

2) Attach the lifting fixtures and collars as shown fig. 1-2.

3) Position the radiator as shown in fig. 1-3 and arrange the ropes A and B. The length of ropes A and B should be the same and more than 1m.

Prortect the radiator with cardboard or cloth at the places marked by *.

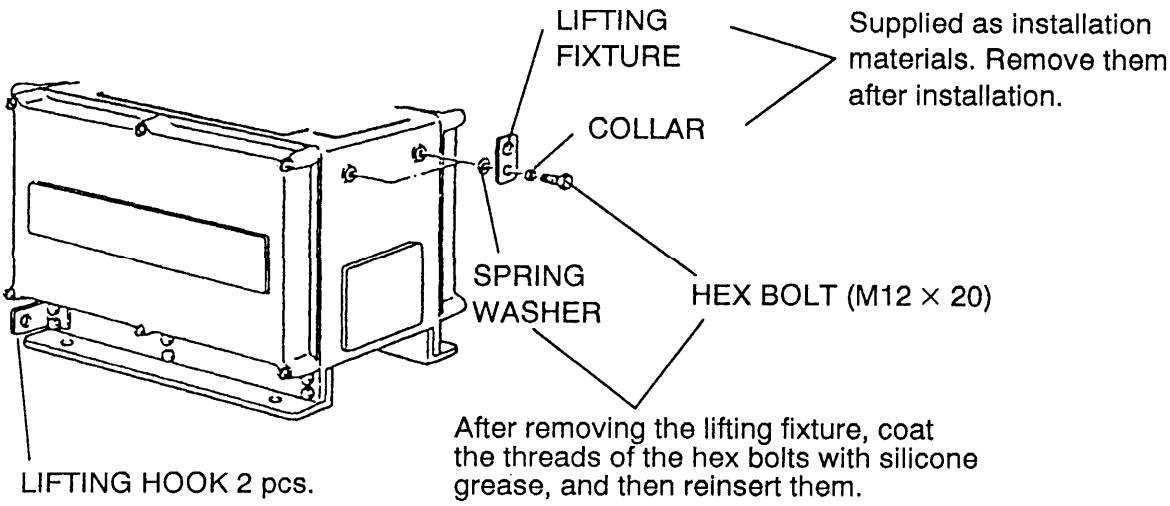


Fig. 1-2

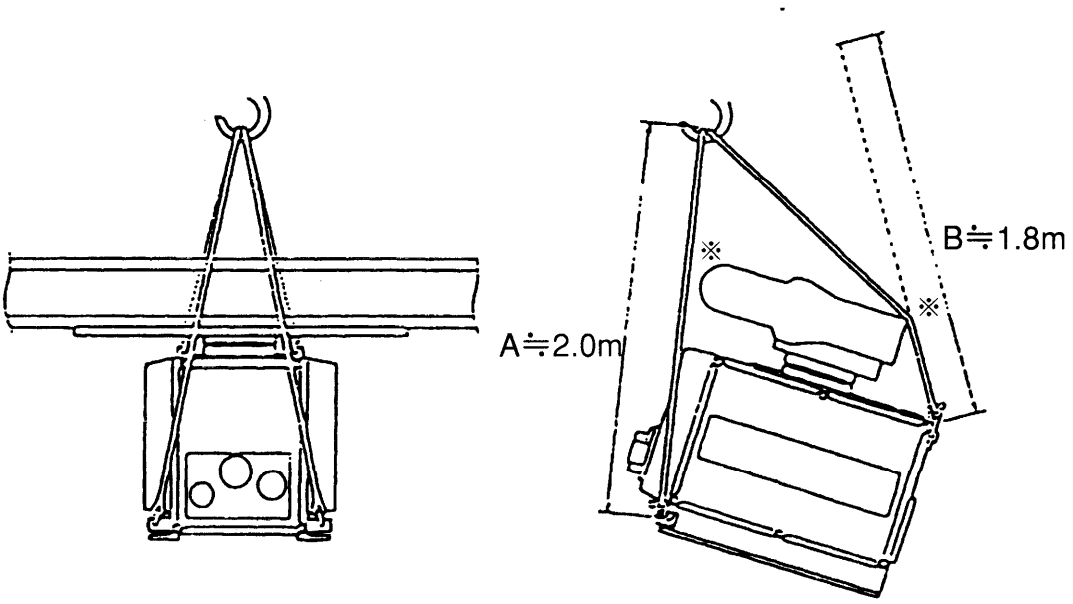


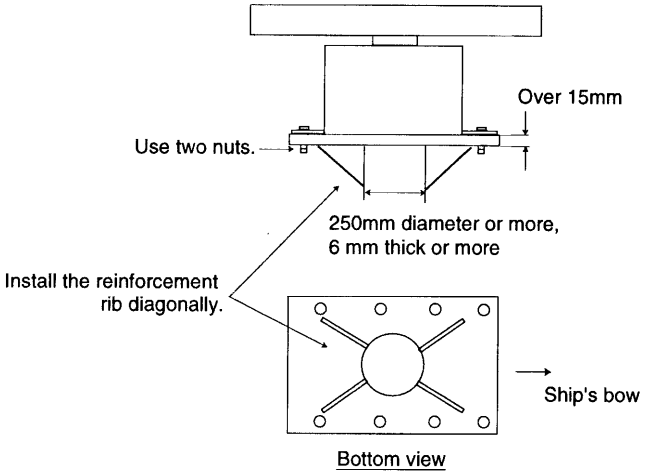
Fig. 1-3

Mounting procedure

The installation method for the antenna unit is illustrated on the next page.

1. Drill eight bolt holes of 15 mm diameter in the radar mast platform or the deck. For antenna unit dimensions, see the antenna unit outline drawing on the page D-6.

   - The diameter of pole for fixing the antenna base must be over 250 mm. (thickness: over 6 mm)
   - The thickness of the antenna base must be over 15 mm.
   - The reinforcement rib must be installed diagonally as shown below.



2. Place the corrosion-proof rubber mat on the chosen mounting location.
3. Following the instructions on page 1-6, lift the antenna unit with radiator and place it on the rubber mat with the cable gland facing the ship's stern (or port, starboard). The lifting fixtures should be removed after installation.
4. Fix the antenna unit to the mounting place with M12 x 70 hexagon bolts, nuts and seal washers.

   - Use two nuts per bolt for strength.

5. Arrange a ground terminal near the antenna base. Use supplied hex bolt (M6 x 25), nut and washer. Fix the supplied ground wire (RW-4747) to the ground terminal.
6. Connect the other end of the ground wire to the ground terminal on the antenna unit.
7. Apply the supplied adhesive (Non-acid type silicone sealant) to the ground terminal and the fixing bolts.

INSTALLING THE SCANNER UNIT

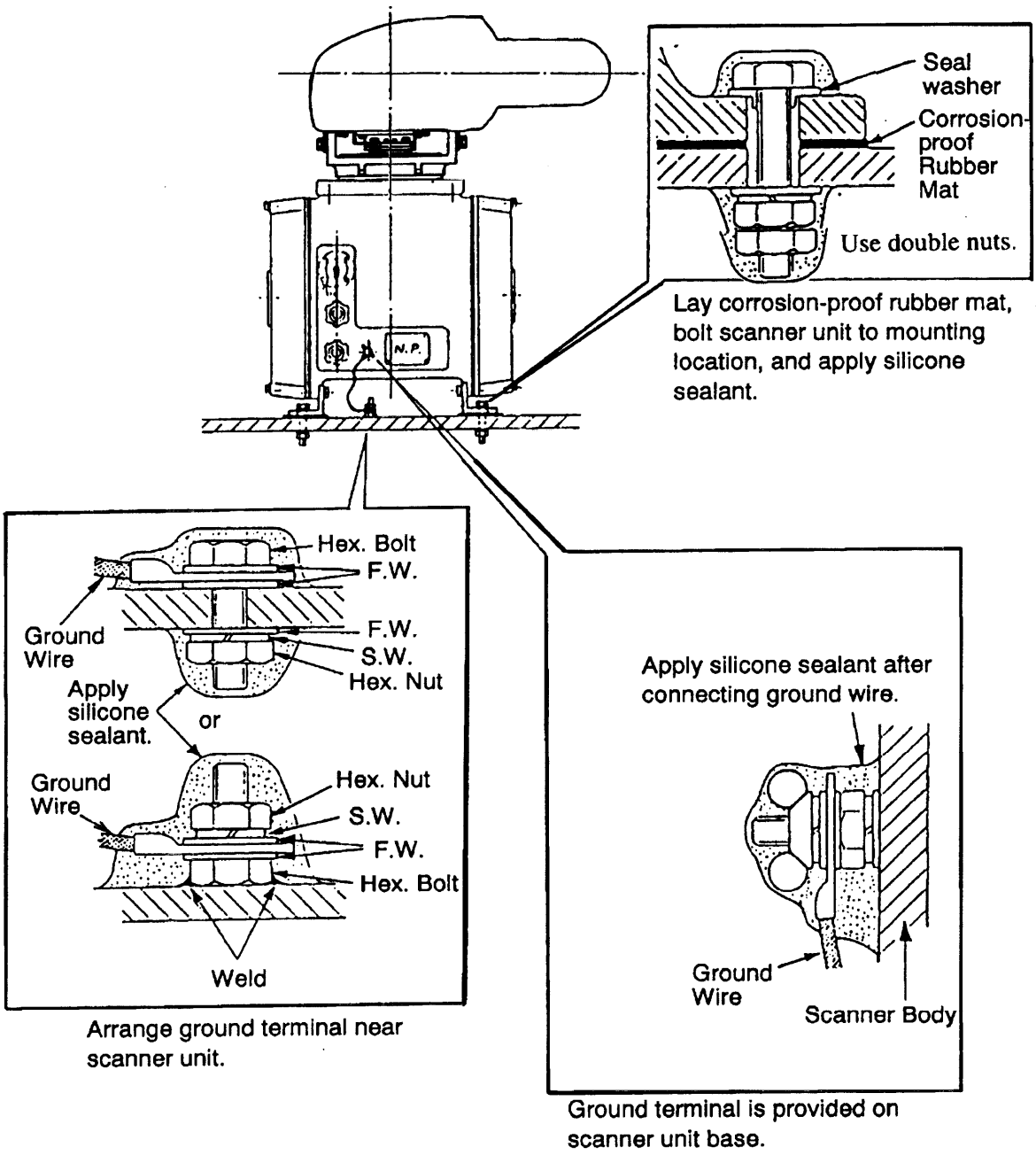


Fig. 1-4

1.4 Mounting the Display Unit

The display unit is designed to be mounted on a tabletop or a pedestal (option).

Before mounting the display unit

If Gyro Converter GC-8 (option) is to be used, install and setup the GYRO PROCESSOR Board before mounting the display unit, because of the difficulty involved if done after the unit is mounted, Insstrutions for installtion and setup are in Chapter 4.

Siting considerations

Lpcate the display unit on the bridge in a place where it can be viewed and operated conveniently. In addition, consider the points noted in the figure which follows.

CAUTION

A magnetic compass will be affected if placed too close to the display unit. The minimum compass safe distances for magnetic compasses are

standard compass: 2.7 m
steering compass: 1.8 m

Consider the points mentioned below when selecting a mounting location for the display unit.

¥ The orientation of the display unit should be so the operator views the screen while facing the bow. This makes determination of position much easier.
¥ The location should be free of water spray.
¥ The daylight bright type radar display sunlight. However, locate the unit out of direct sunlight and away from heat sources because of heat that can build up inside the cabinet.
¥ The mounting location should be determined consiering the lengt of the signal cable between the antenna unit and the display unit. (The signal cable comes in lengths of 15, 20 or 30 meters; maximum 100 meters.)
¥ Leave sufficient space around the unit for maintenance and servcing. See the display unit ouline drawing forrecommended maintenance space.

Mounting procedure

Tabletop

1) Unfasten the three M10 bolts at the front of the display unit and separate the mounting base from the display unit.
2) Drill five holes of 12mm diameter in the tabletop.
3) Secure the mounting base to the tabletop by using M10 nuts, bolts and flat washers.
4) Place the display unit on the mounting base and fasten it to the mounting base with the bolts removed in step 1.

Pedestal

Fix the pedestal to the mounting location with M12 nuts, bolts and washers. (The cable gland is at the bottom of the pedestal.) See the outline drawing at the back of this manual.

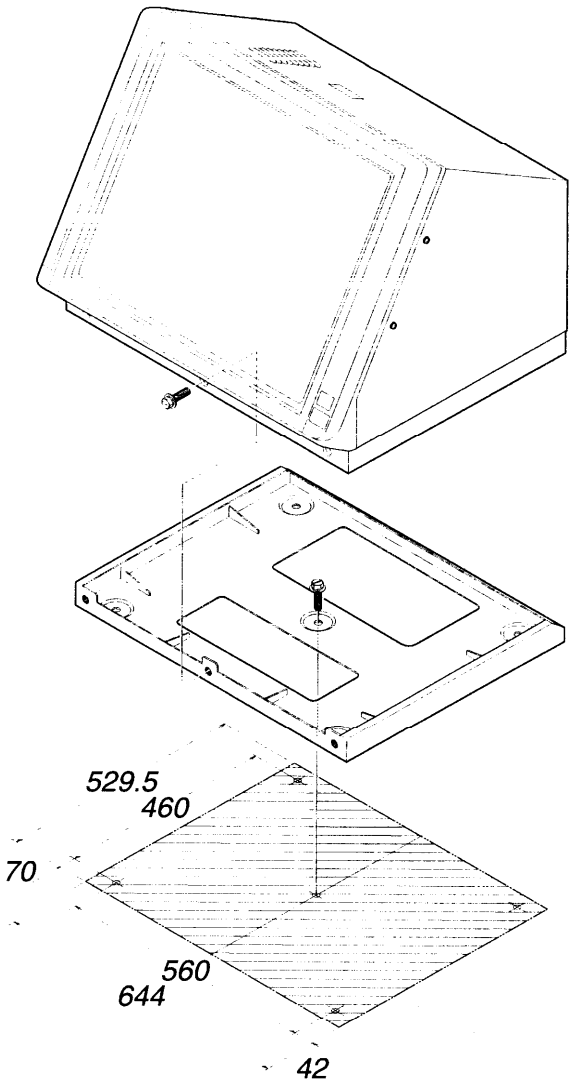


Figure 1-5 Mounting dimensions for tabletop mount display unit

1.5 Mounting the Separate Type Control Panel

The separate type control panel connects to the display unit with a connection cable. Nonslip rubber feet (supplied) can be attached to the bottom of the control panel. The panel can be permanently fixed to a tabletop with the control panel fixing plate kit (option).

2. CONNECTIONS

2.1 Antenna Unit Connections

Two cables run between the display unit and the antenna unit, the signalcable and the antenna cable.

Fabricating antenna cable 660V-MPYCY-12/250V-MPYCY-12 (JIS cable)

1. Shorten the cable making the length from the cable gland to the cable end inside the scanner unit 450 mm. Remove the vinyl sheath of the cable by 450 mm; the armor by 440 mm.

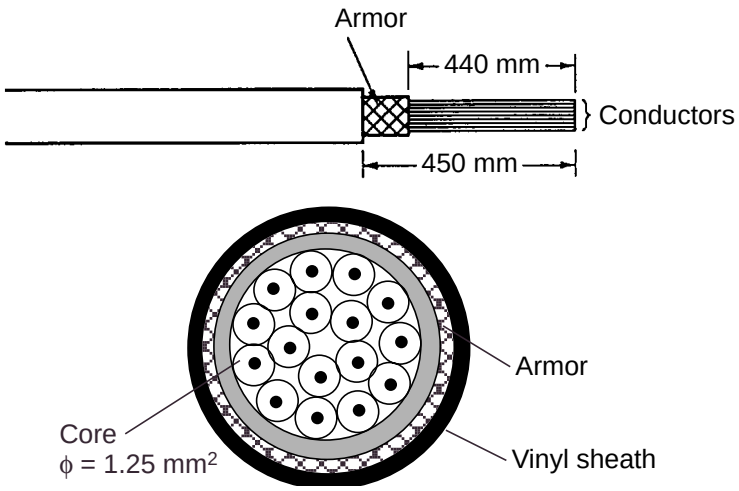


Figure 2-1 Fabrication of multicore cable 660V-MPYCY-12/250V-MPYCY-12

2. Turn off the ANT MOTOR SW on the scanner unit.

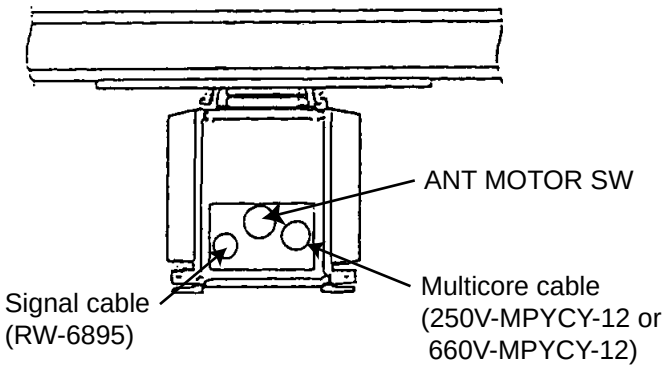


Figure 2-2 Scanner unit, bow view

3. Open the left side cover on the scanner unit with the hex wrench (Supplied).
4. Unfasten the cable gland for the multicore cable and remove the gasket and flat washers.
5. As shown in Figure 2-3, slide the clamping gland, flat washers and gasket on the multicore cable.

6. Fold back armor by 5 mm and pass it through the two flat washers as shown in Figure 2-3.

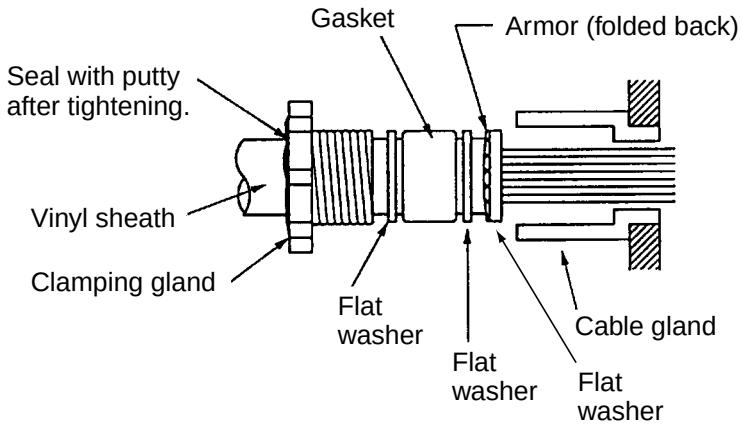


Figure 2-3 Passing clamping gland, washers and gasket on the multicore cable

7. Shorten conductors considering their locations on the terminal board STB-1.

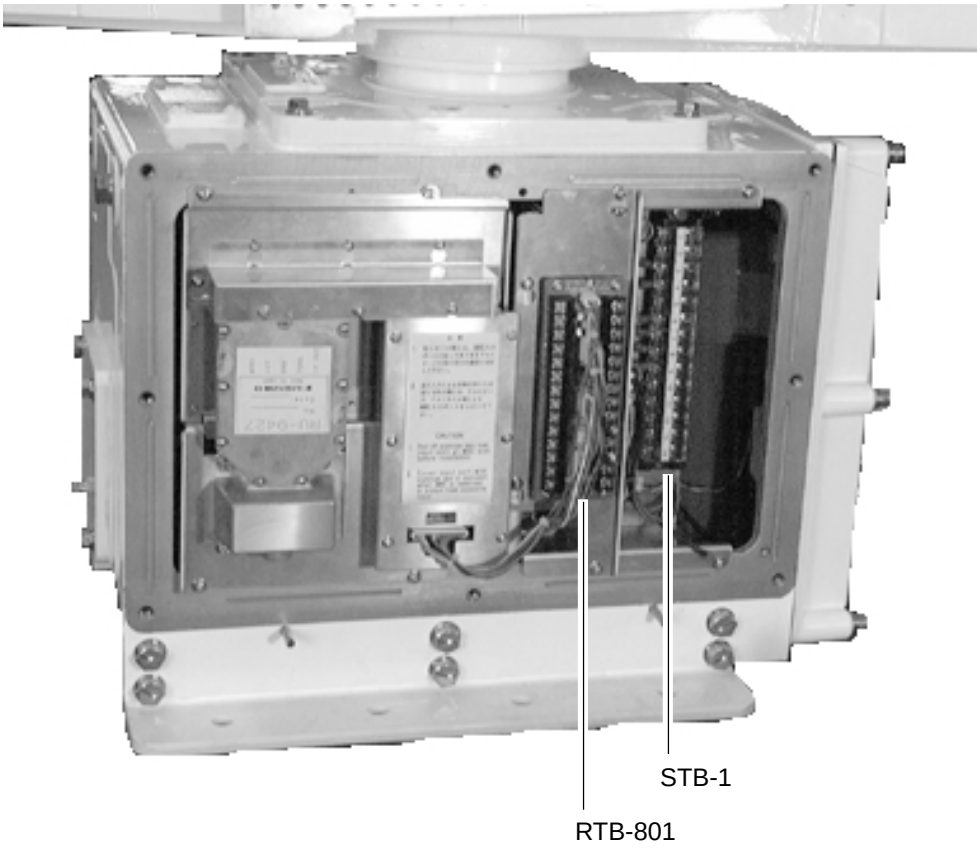


Figure 2-4 Scanner unit, port side view

8. Confirm that armor is grounded between two flat washers.
9. Remove the sheath of each conductor by 6 mm. Fix crimp-on lugs (FV1.25-4, blue, ø4) to each conductor. Make sure each connection is secure both electrically and mechanically.
10. Tighten the clamping gland.
11. Seal the cable gland with putty.
12. Connect the conductors to terminal board STB-1 referring to the interconnection diagram on page S-1.

Fabricating signal cable RW-6895

13. At the signal cable gland on the scanner unit, unfasten the clamping gland and remove gasket and flat washers.

14. Shorten the signal cable making the length from the cable gland to the cable end 500 mm. Remove the vinyl sheath by 550 mm; the armor by 540 mm.

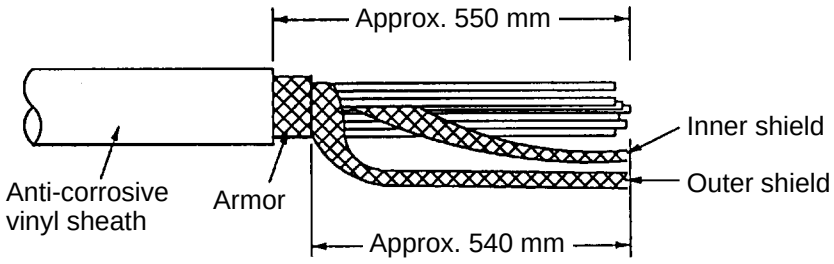


Figure 2-5 Fabricating the signal cable RW-6895

15. Unravel the outer shield with a screwdriver or similar tool to expose the cores beneath the outer shield. Similarly, expose the cores beneath the inner shield. Mark all cores for future identification.

16. As shown in Figure 2-6, slide the clamping gland, washers and gasket onto the signal cable. Fold back the armor by 5 mm, and then pass it through the two flat washers.

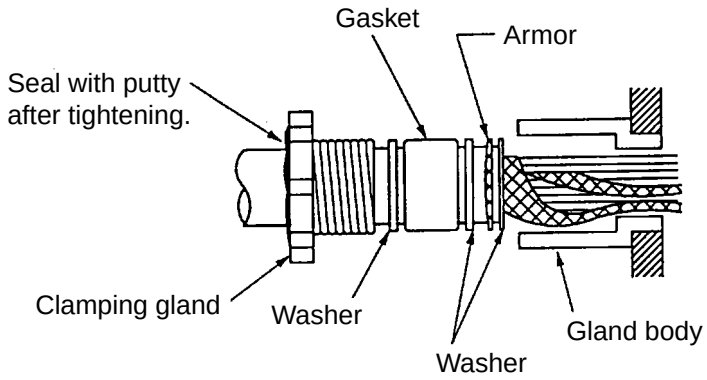


Figure 2-6 Passing clamping gland, washers and gasket on signal cable

17. Unfasten the terminal board RTB-801.

18. Pass the signal cable behind the terminal board plate for cable MPYCY-12, and then pass it through the locking wire saddle.

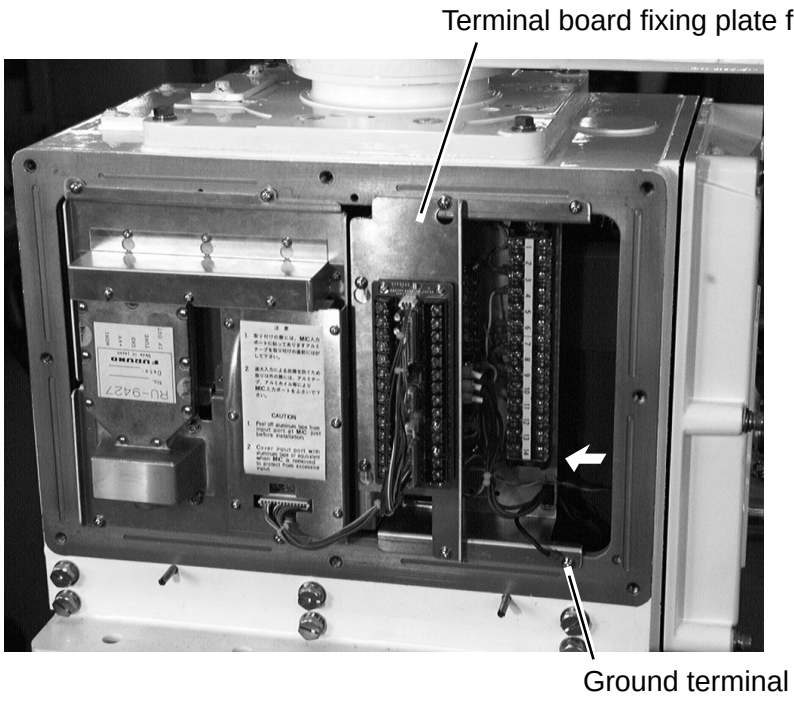


Figure 2-7 Scanner unit, rear view

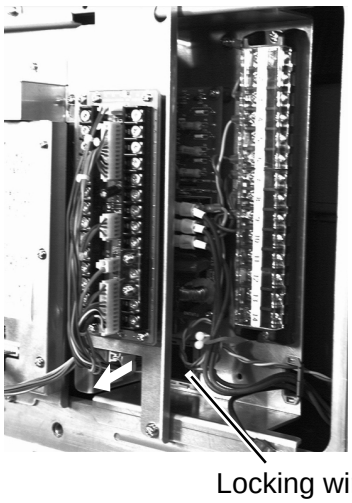


Figure 2-8 Scanner unit, rear view

19. Fasten the terminal board fixing plate for RTB-801.

20. Route the signal cable beneath the lower left side of the terminal board fixing plate for the RTB-801. Shorten conductors of the signal cable considering their locations on the RTB-801.

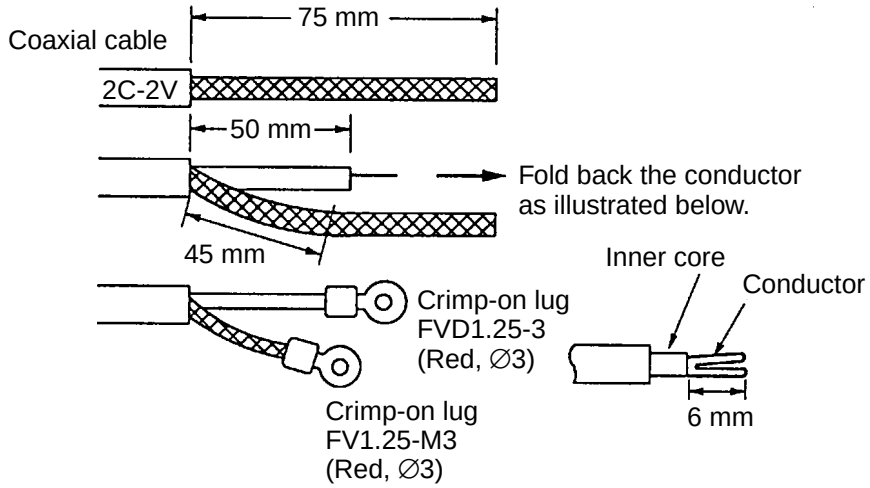


Figure 2-9 Fabrication of coaxial cable

21. Shorten the shield considering the distance to the ground terminal on the left side of the scanner unit chassis. (See Figure 2-7 for location.) Attach the crimp-on-lug FV5.5-4 (ø4, yellow) to the shield.

22. Remove approx. 6 mm of the vinyl insulation from the end of each conductor and fix the crimp-on lug FV1.25-M3 (Red) to each conductor. As shown in Figure 2-8, fold back the coaxial cable four times and attach the crimp-on-lug FVD1.25-3 (ø3, red). Attach the crimp-on-lug FVD1.25 (ø3, red) to the shield.

23. Tighten the clamping gland, and then seal the cable gland with putty.

24. Fasten the shield to the ground terminal on the scanner unit chassis.

25. Connect conductors to the terminal board RTB-801 referring to the interconnection diagram.

    When the length of the signal cable is more than 150 m, remove the solder at terminal Nos. 24 (red) and 26 (black) on the DJ-1 connector. (#24 and #25 are spares.). Fasten the wires as shown below.

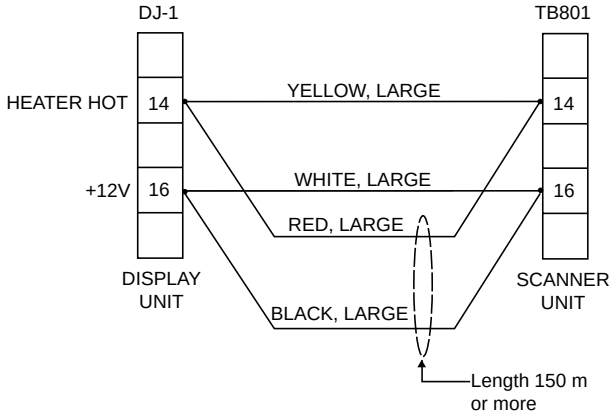


Figure 2-10 Wiring on terminal boards when length of signal cable is 150 m or more

26. Check for miswiring, loose screws. Grease the fixing bolts for the cover, gasket, and tap holes in the scanner chassis. Attach the cover.

When the De-Icer is installed

1) Before beginning any work on the scanner unit, turn off both the DE-ICER switch (S31) on the sub panel of the display unit and the breaker for the de-icer line at the main switchboard to remove the power (100 VAC, 1ø) to the de-icer. (Turning off the power to the display unit has no effect.)

2) The neck of the scanner unit becomes VERY HOT when the de-icer is working. (The de-icer turns on when ambient temperature is below 0°C.)

2.2 Display Unit Connection

Two cables are terminated at the display unit: the signal cable RW-4839 or RW-6895 and the power cable. The signal cable, available in lengths of 15m, 20m, or 30m, comes with a connector preattached to it for connection to the display unit.

Fabricating power cable DPYCY-3.5

1) Remove the vinyl jacket by 150mm.

2) Cut off jute tape wrapped around the braided shield.

3) Unravel the braided shield to expose the cores by about 120mm.

4) Slip the terminal cap onto the core.

5) Remove insulation of cores by about 10mm. Fix crimp-on lugs to the cores and braided shield.

6) Cover the braided shield with vinyl tape, leaving the portion which will lie inside the cable clamp untaped.

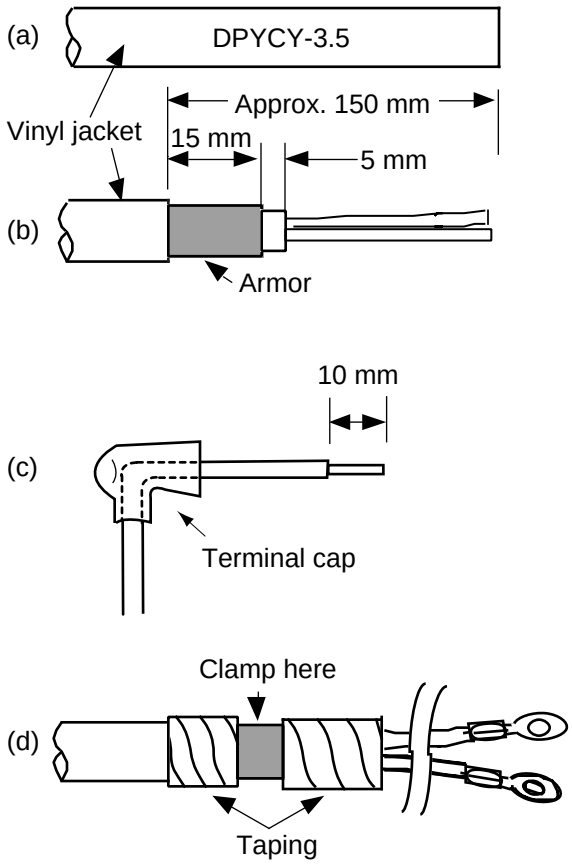


Figure 2-11 How to fabricate power cable DPYCY-3.5

Leading in cables to the display unit

To lead in cables easily, unfasten the cable clamp at the right side of the display unit.

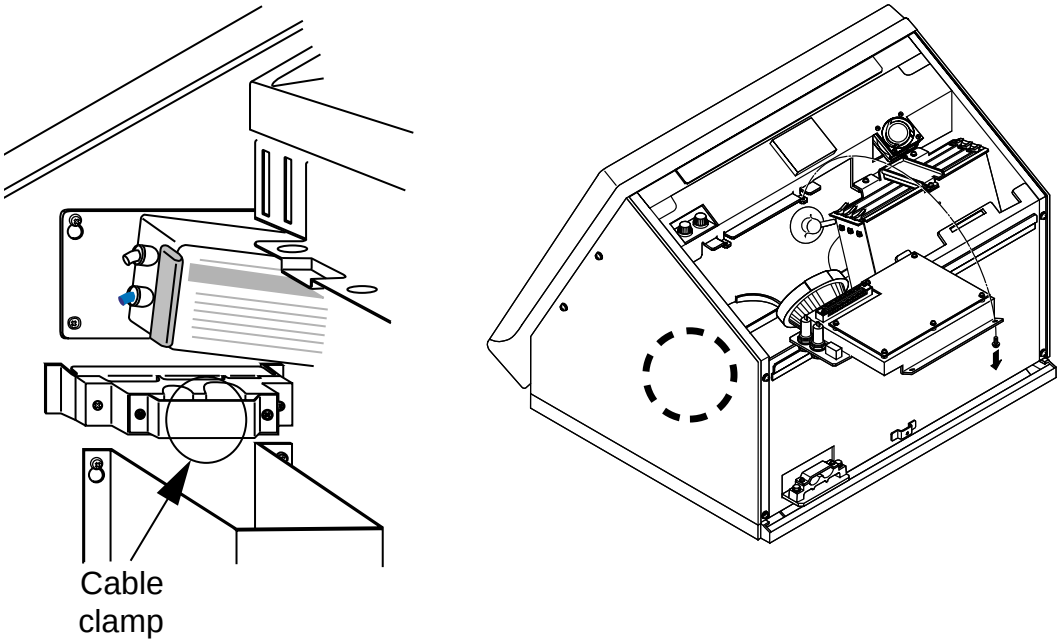


Figure 2-12 Location of cable clamp inside the display unit

Tabletop

Cables can be led in through the cable gland at the rear or underside of the unit.

Pedestal

Lead in cables through the cable gland at the bottom right-hand side of the pedestal. Pass cables through the cable clamp and tighten the cable clamp. Fix cables to the pedestal frame with cable ties as shown in Figure 2-13. Finally, pass cables through the cable clamp at the right side of the display unit and then tighten the cable clamp.

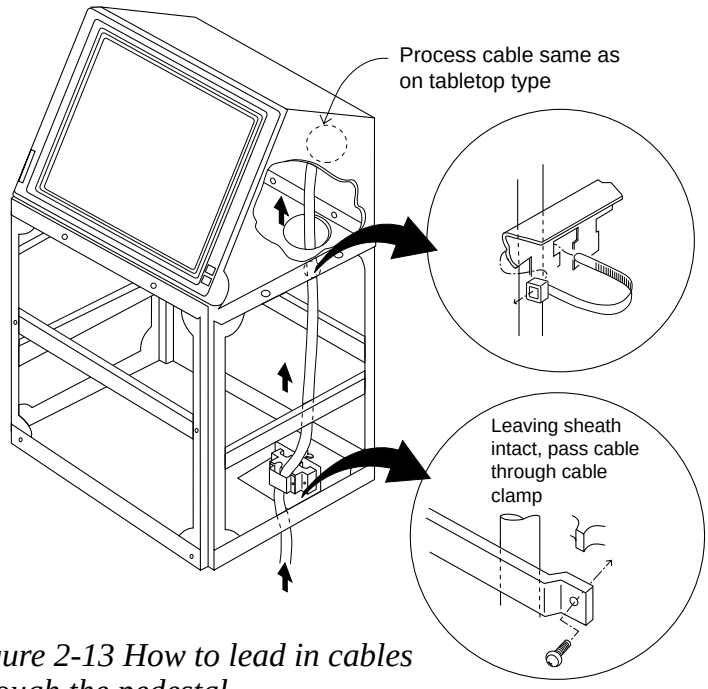


Figure 2-13 How to lead in cables through the pedestal

Connections

Power cable

Connect the power cable to the filter at the right hand side of the display unit. Cover the filter terminals with the terminal caps (supplied) to insulate the terminals.

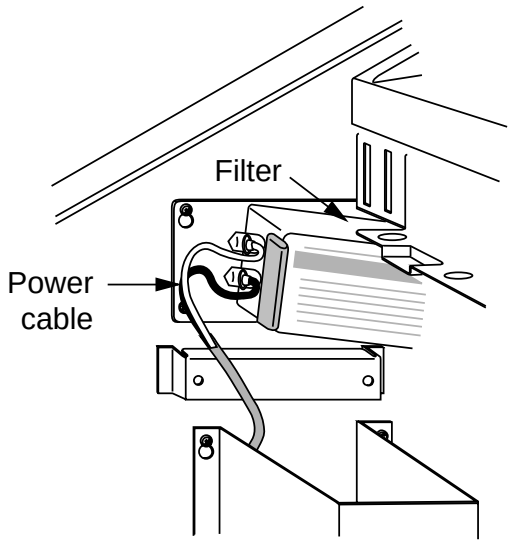


Figure 2-14 Location of filter inside the display unit

Gyro signal

Solder the 5 pin and 3 pin VH connectors (supplied) to the gyrocompass cable. Plug in the connectors on the GYRO CONVERTER Board. For further details, see page 4-2.

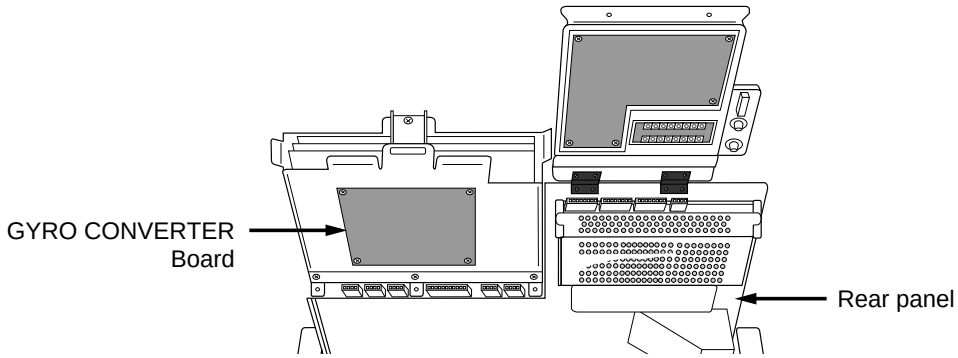
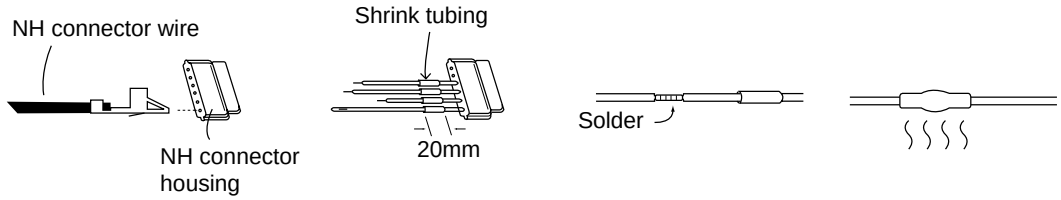


Figure 2-15 Location of GYRO CONVERTER Board

HOW TO ATTACH NH CONNECTOR TO SIGNAL CABLE



① Insert NH connector wire into NH connector housing.

② Cut shrink tubing in 20 mm lengths and slip onto each wire.

③ Solder connector to signal cable.

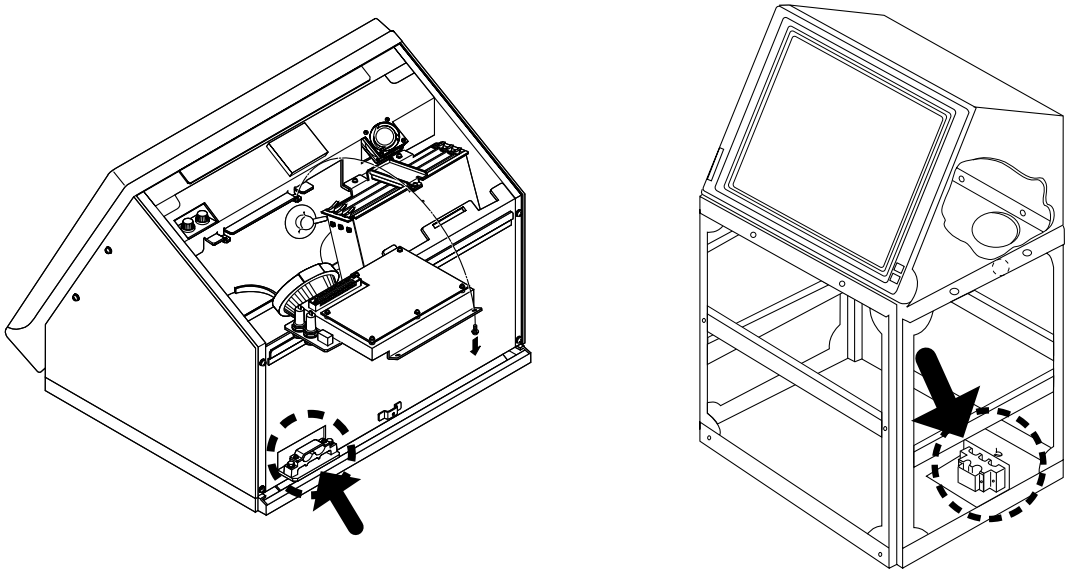
④ Heat shrink tubing with soldering iron.

Grounding

The display unit must be grounded from a grounding stud having a wing nut located at the point shown in Figure 2-16.

CAUTION

An ungrounded unit can cause electrical shock when its metallic parts are touched and give off or receive electromagnetic interference.



Tabletop type Pedestal type

Figure 2-16 Grounding the display unit

Radar buoy

Solder the radar buoy signal line to the "BUOY" connector on the VDA Board. Connect the trigger line to the corresponding connector on the INT Board.

Signal input/output circuit (INT Board INT-9170)

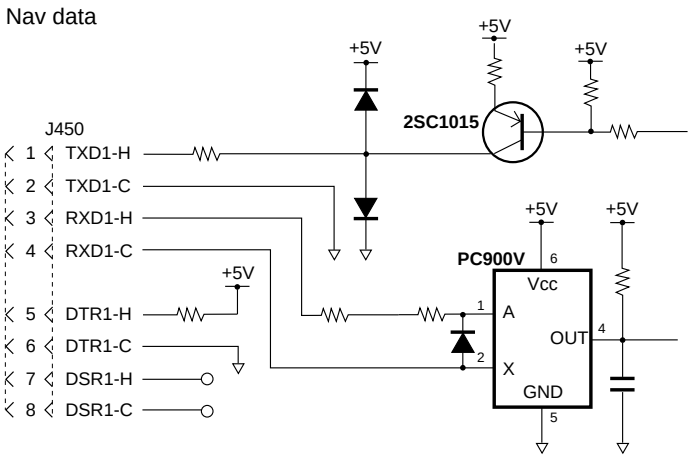


Figure 2-17 INT Board circuit

For other input/output circuits, see the circuit diagram of the INT Board at the back of this manual.

Table 2-1 Input and output signals on the INT Board

Signal name	Name on pcb	Connector no.	Connector type	Applicable equipment	Remarks
Input Signal					
Gyro signal		J4* J5*	VH, 5 pin VH, 3 pin		*: On pcb A64P1106 (option)
Speed log signal	LOG	J448	NH, 3 pin		200 pulses/nm, etc.
Current indicator signal (tide)	NAV COURSE	J459	NH, 4 pin		Not used
Current indicator signal (speed)	NAV SPEED	J460	NH, 3 pin		Not used
Radar buoy signal	RADAR BUOY	J445	NH, 4 pin		
Remote display signal	EXT-RADAR or RJ-7	J458	NH, 8 pin		
Rudder angle signal	ROT RUDDER	J464	NH, 7 pin		
Output Signal					
External ARPA signal	EXT-ARPA	J444	NH, 8 pin	FA-2805	heading, bearing, Tx trigger
Slave display signal	SLAVE	J442 J443	NH, 8 pin	CD-140, CD-141, GD-500, FMD-800, FMD-8000 *1 *1: Display unit for FR-2800 series radar can be used as slave display unit.	heading, bearing, video, Tx trigger
Buzzer signal	EXT-BUZ	J451	NH, 3 pin	OP03-21-3	buzzer drive signal
Buzzer signal (AC)	EXT-BUZ (AC)	J452	NH, 2 pin	Speaker w/amp	speaker signal
Monitor signal		J449	NH, 10 pin		VER synchronous, HOR synchronous, video (NTSC for-mat)
RJ-8	RJ-8	J456	NH, 4 pin		
Input/Output Signal					
INS data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin NH, 8 pin		
Nav data	N AV DATA	J450	NH, 8 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		

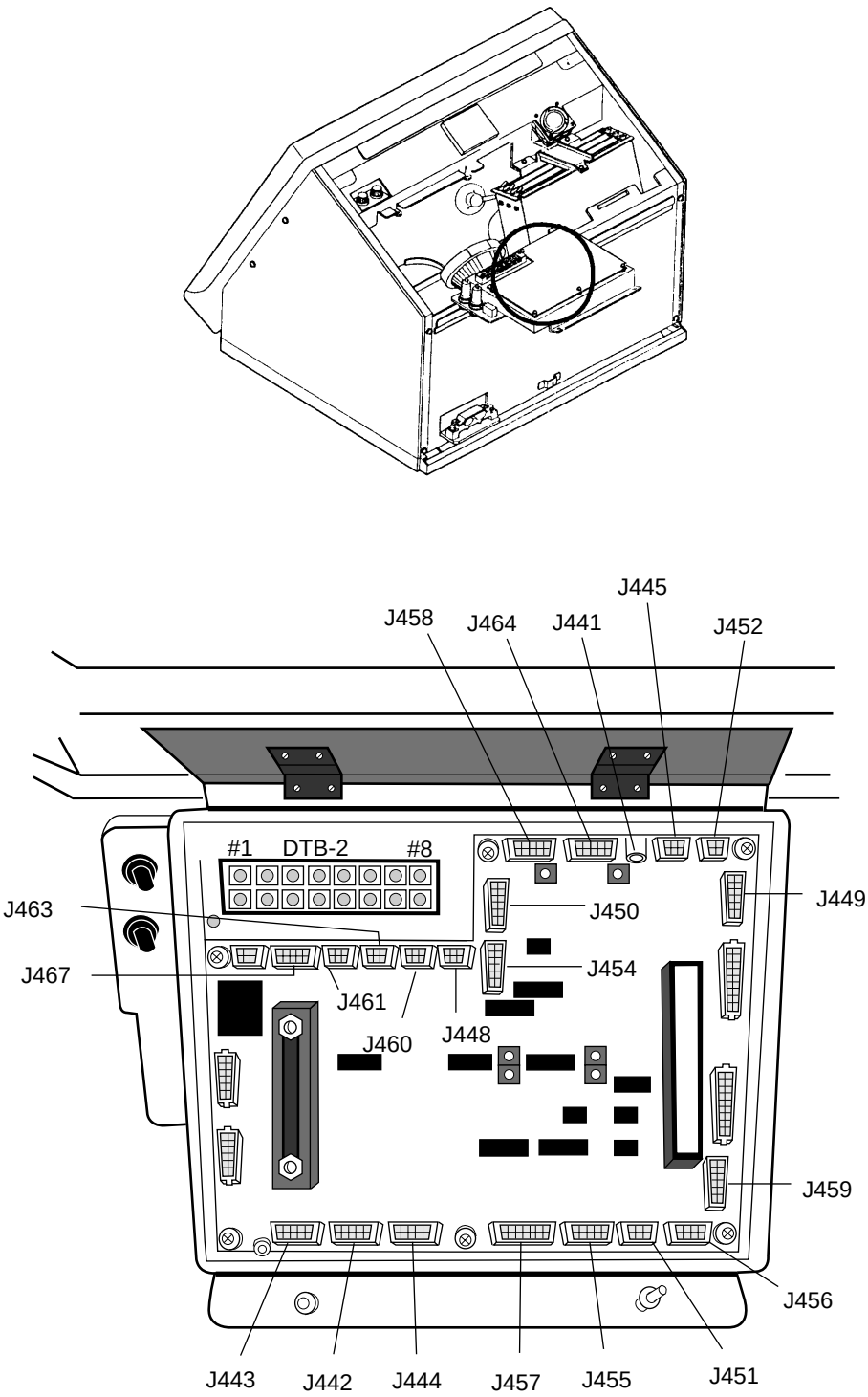


Figure 2-18 Location of connectors on the INT Board

Grounding cables and covering unused cable slots in the cable clamp

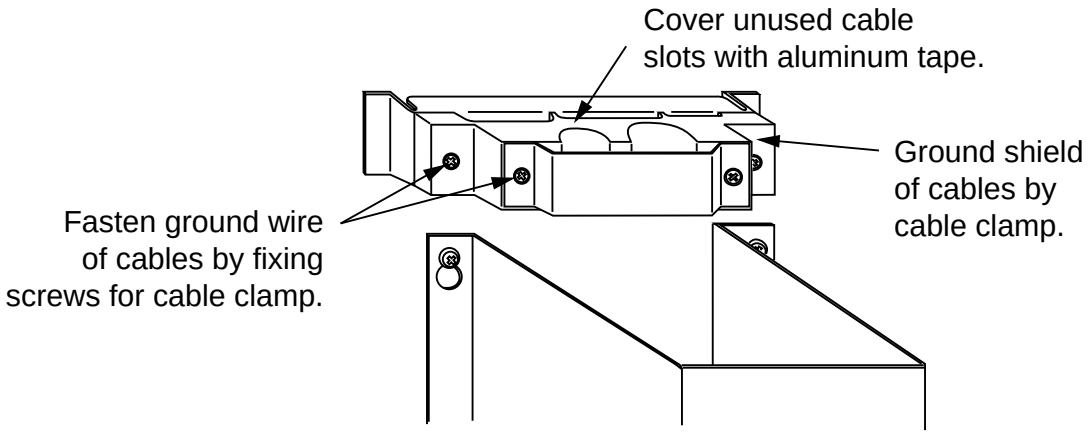


Figure 2-19 Cable clamp

CAUTION

1) The display unit must be grounded. Failure to ground the unit may cause electrical shock when its metallic parts are touched and give off or receive electromagnetic interference.
2) Cover unused cable slots in the cable clamp with aluminum tape to prevent foreign objects from falling into the display unit through the cable slots.

2.3 Changing Power Specifications

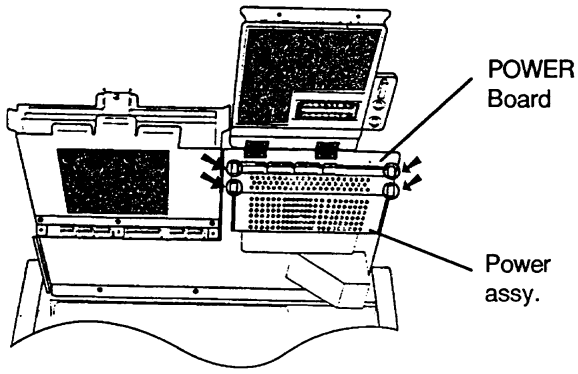
This radar can be powered by 100V AC or 220V AC, and is set at the factory for connection to a 100V power supply. To power the unit by 220V AC, remove jumper JP13 on the POWER Board as shown in the procedure below.

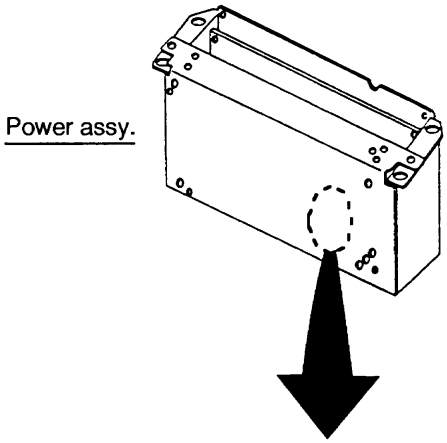
⚠ CAUTION

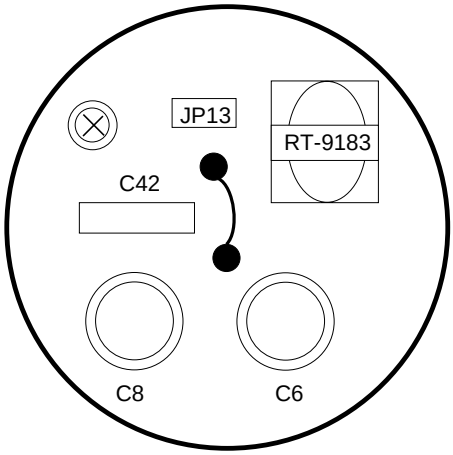
Turn off the power before executing the procedure shown below.

Procedure

1) Turn off the power.
2) Unfasten the four screws circled in the illustration at right.
3) Remove the power assembly.
4) Remove the power assembly cover.
5) For 220V power supply, remove jumper wire JP13 on the POWER Board.
6) Mount the power assembly.







Power	Jumper wire JP13
100 VAC	Short
220 VAC	Remove

2.4 Power Supply Unit

Wire the unit as shown in the interconnection diagram.

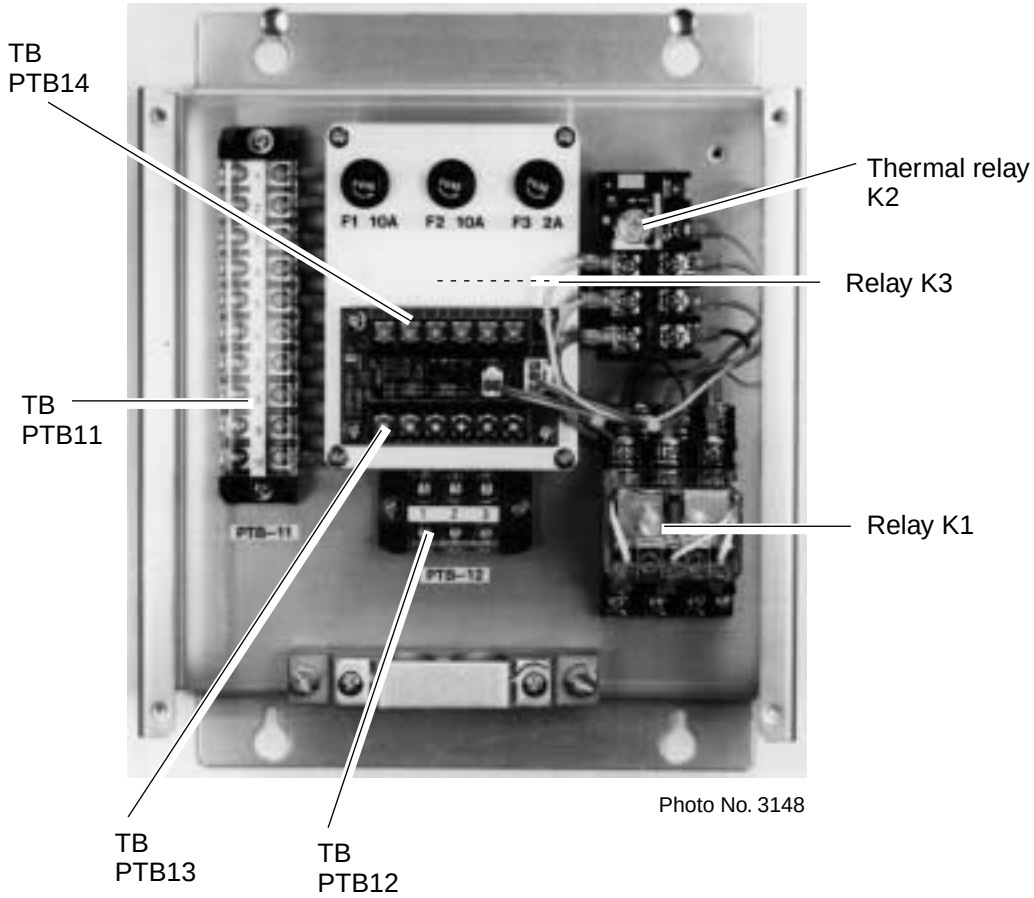


Figure 2-20 Power supply unit PSU-004

The type and rating of the thermal relay (K2) are as below.

Ship's Mains	Scanner Unit	Thermal Relay (K2)	
		Type	Rating
200/220 VAC, 3∅	RSB-0026	TR-0NH/3 1.7A	2.3 A
380/440 VAC, 3∅	RSB-0031	TR-0NH/3 0.8A	1.0 A
220 VAC, 3∅, 50Hz	RSB-0088	TR-0NH/3 1.7A	2.6A(MAX)*
220 VAC, 3∅, 60Hz	RSB-0089	TR-0NH/3 1.7A	2.6A(MAX)*
440 VAC, 3∅, 60Hz	RSB-0090	TR-0NH/3 0.8A	1.2A(MAX)*

*: Set the rating to maximum (2.3A to 2.6A or 1.0A to 1.2A) for HSC radar.

3. INITIALIZATION AND ADJUSTMENT

3.1 Menus for Initialization and Adjustment

Accessing the menus

The menus for initialization and adjustment of this radar are locked to prevent adjustment by the user. To access them;

1) Turn off the power.
2) Turn on the #4 segment of DIP Switch S1 on the SPU Board.

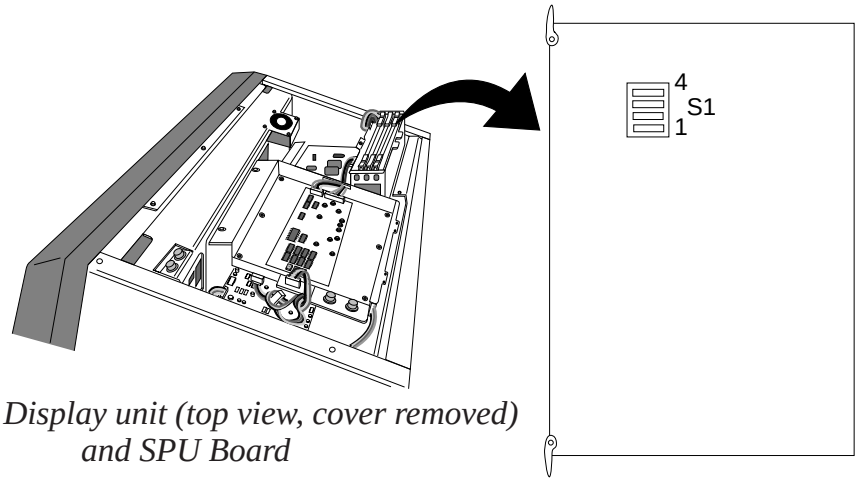


Figure 3-1 Display unit (top view, cover removed) and SPU Board

Menu operation

1) Press the [RADAR MENU] key.
2) Press appropriate numeric key to select menu desired.
3) Press numeric key to select item.
4) Press same numeric key pressed in step 3 to select option.
5) Press [ENTER] to register selection.

Menu description and menu tree

See pages 3-6 and 3-11, respectively.

Restoring default settings

1) Press [RADAR MENU] [0] [0] [2] [0] [0] [0] [0] to select FACTORY DEFAULT on the INITIAL SETTING 4 menu.
2) Press the [ENTER] key.
3) Wait for 10 seconds.
4) Turn power off, and on again.
5) Press [RADAR MENU] [0] [0] [2] [0] [0] [0] [2] to select MODEL on the INITIAL SETTING 4 menu.

6) Press the [2] key several times to select OTHER S-BAND.

7) Press the [ENTER] key.

3.2 Heading Alignment

Antenna unit mounted error (heading reed switch timing error) can be compensated at the display unit.

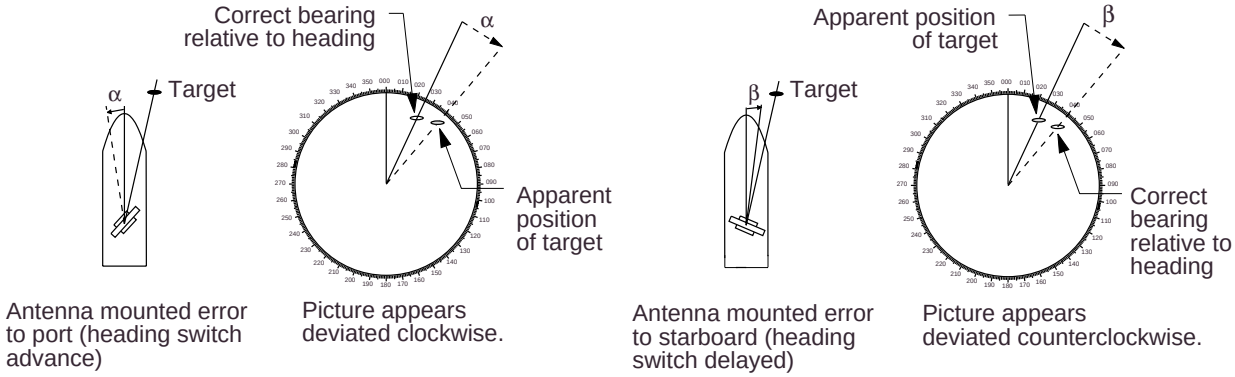


Figure 3-2 Heading alignment error

Procedure

1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [2] to select HD ALIGN on the INITIAL SETTING 1 menu.

2) Select a target echo (by gyrocompass, for example) at a range between 0.125 and 0.25nm, preferably near the heading mark.

3) Operate the EBL control to bisect the target echo. (The value shown on the display is antenna position in relation to ship's bow.)

4) Press [ENTER] to finish.

3.3 Adjusting Sweep Timing

Sweep timing differs with respect to the length of the signal cable between the antenna unit and the display unit. Adjust sweep timing at installation to prevent the following symptoms:

- The echo of a "straight" target (for example, pier), on the 0.25nm range, will appear on the display as being pulled inward or pushed outward. See Figure 3-3.
- The range of target echoes will also be incorrectly shown.

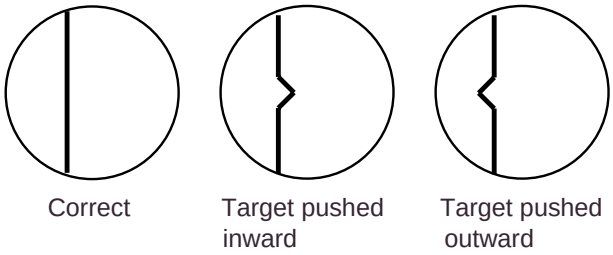


Figure 3-3 Examples of correct and incorrect sweep timings

Procedure

1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [3] to select TIMING ADJ on the INITIAL SETTING 1 menu.
2) Transmit on the 0.25nm range.
3) Adjust radar picture controls to display picture properly.
4) Select a target echo which should be displayed straightly.
5) Adjust the VRM control to straighten the target echo.
6) Press the [ENTER] key.

3.4 Adjusting Video Signal Level

When the signal cable is very long, the video amplifier input level decreases, shrinking target echoes. To prevent this, confirm (and adjust if necessary) video amplifier input level.

Procedure

1) Connect an oscilloscope to TP3 on the INT Board (INT-9170).
2) Transmit on the 12nm range. Take trigger at TP10 on the same board.
3) Adjust VR1 on the INT Board so the value of TP3 is 4Vpp. (For secondary display, adjust VR2 for same level.)

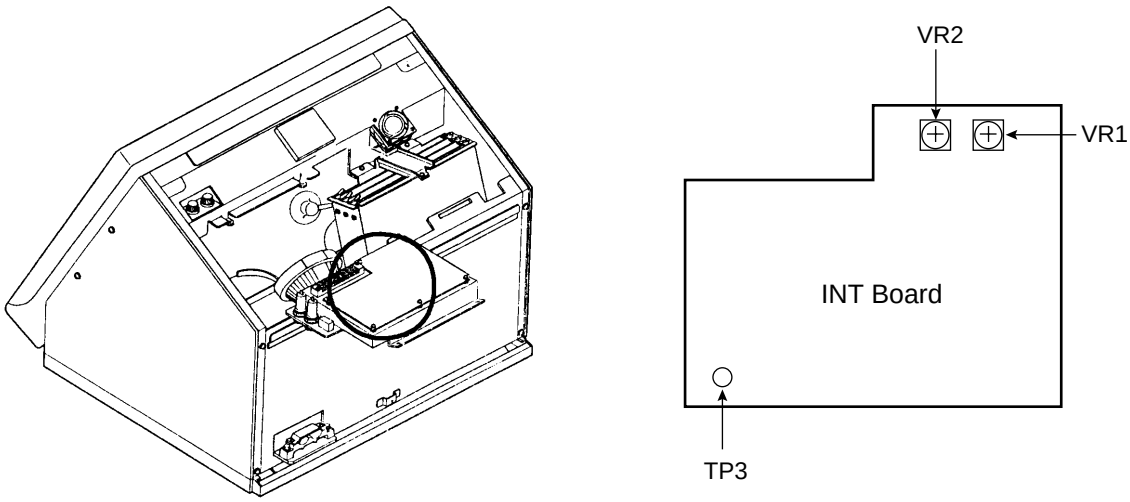


Figure 3-4 Location of INT Board

3.5 Suppressing Main Bang

If main bang appears at the screen center, suppress it as follows.

Procedure

1) Turn on the power. Transmit on a long range and then wait ten minutes.
2) Adjust [GAIN] control to show a slight amount of noise on the display.
3) Select the 0.25nm range. Adjust the [A/C SEA] control to suppress sea clutter.
4) Open the tuning compartment on the control unit.
5) Set VR901(MBS-L) at two o'clock and then slowly turn VR902 (MBS-T) clockwise to suppress main bang.
6) If main bang still exists, turn VR901 clockwise slightly, and then slowly turn VR902 clockwise. **Note that excessive main bang erases targets in close range.**

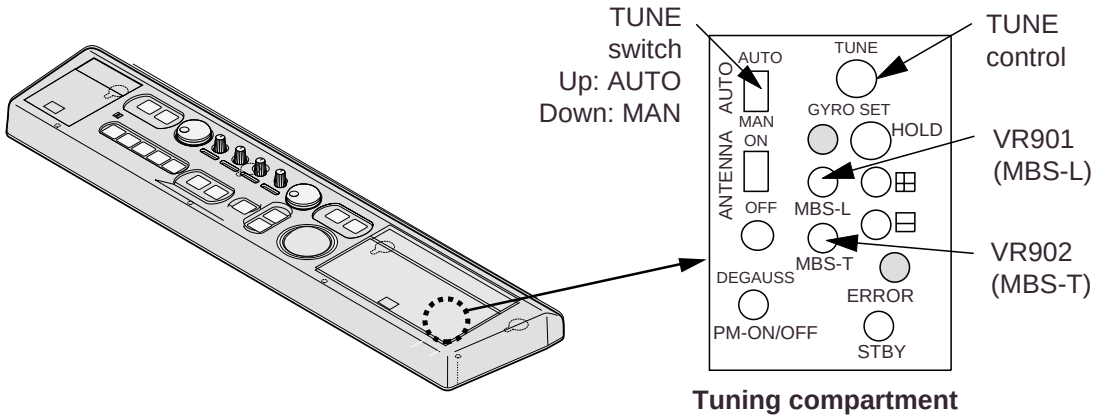


Figure 3-5 Control unit, location of tuning compartment

3.6 Confirming Tuning

The radar receiver can be tuned both automatically and manually. Confirm that the radar can be tuned both automatically and manually.

Procedure

1) Turn on the power. Set the TUNE switch in the top right hand panel to MANU.
2) Transmit on the 48nm range.
3) Adjust sensitivity and picture brilliance. Turn the [A/C SEA] and [A/C RAIN] controls fully counterclockwise (off).
4) While observing the picture, turn the [TUNE] control in the tuning compartment slowly counterclockwise (clockwise) more than twice to get best (worst) tuning point.

5) Turn the [TUNE] control slowly clockwise (counterclockwise) to display the longest tuning bar.

6) Set the TUNE switch to AUTO and wait about 10 seconds (about four rotations of the antenna).

7) Confirm that the radar found best tuning point. Peak tuning is obtained when about 80% of the tuning indicator lights.

3.7 Confirming Magnetron Heater Voltage

Magnetron heater voltage is adjusted at the factory. Confirm that magnetron heater voltage is within the prescribed rating as follows:

1) Turn on the radar and select the 0.125 mile range.

2) Press [RADAR MENU] [0] [0] [2] [0] to open the INITIAL SETTING2 menu.

3) Press [5] to select the 5. SCANNER STOPPED field and the TX option.

4) Turn off the antenna switch in the display unit.

5) Connect a multimeter, set to the 10 VDC range, between #12(+) of P801 and the chassis.

6) The multimeter should read 9.2-9.4 V. If not, adjust VR1.

7) “Transmit” on the 48 mile range.

8) The multimeter should read 7.3-8.3V.

9) Press [RADAR MENU] [0] [0] [2] [0] [5] to select the 5. SCANNER STOPPED field and the ROTATE option.

10) Turn on the ANT MOTOR SW on the scanner unit.

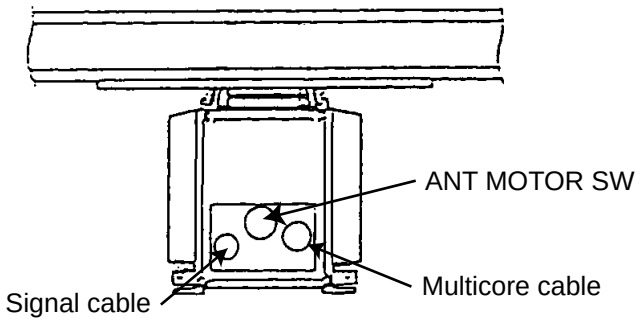


Figure 3-6(a) Scanner unit, bow view

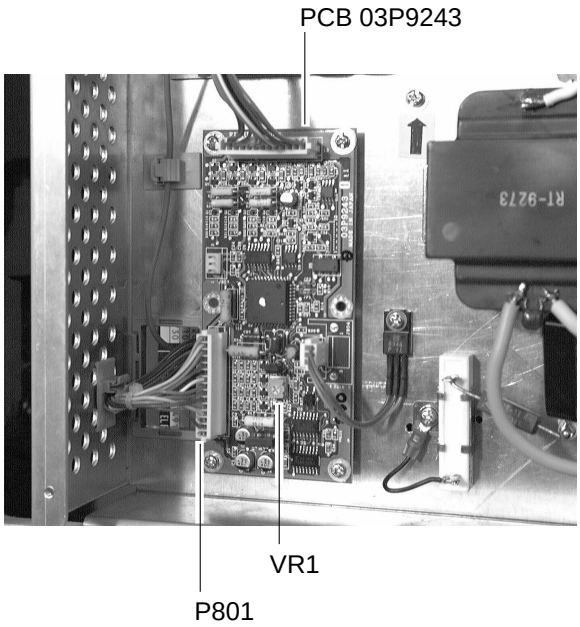


Figure 3-6(b) Scanner unit, stern side view

3.8 Initial Setting Menus

The INITIAL SETTING menus (four menus) setup the radar according to expected usage, authorities specification, ship's characteristics, operator's preference, etc. Set items on each menu accordingly.

INITIAL SETTING 1 menu

HD ALIGN: Compensates for heading error in bow direction.

TIMING ADJ: Adjusts sweep timing, which varies according to signal cable length.

ANT HEIGHT: Enter height of antenna above water.

LOG PULSE: Enter speed log's pulse rate.

SHIP INFORMATION: Enter ship's characteristics; length, width, radar position, nav antenna position, turn rate, and speed rate. Those data will be used for the anchor watch alarm, docking, etc.

ON TIME, TX TIME: Shows number of hours the radar has been turned on and transmitted, respectively. Value can be change to monitor magnetron usage, etc.

INITIAL SETTING 2 menu

RADAR PICTURE: Selects radar picture configuration; round or oval.

KEY BEEP: Turns key response beep on or off.

SCANNER STOPPED: Set to ST-BY in normal use. TX enables transmission state without scanner rotation.

VIDEO SIGNAL: Set to ANLG (analog) for normal use. Set for DGTL to adjust QV (Quantized Video).

ALARM LEVEL: Sets echo strength which triggers guard alarm. "7" is strongest echo; "4" is medium strength echo.

DISPLAY: Select radar display function; main or sub (slave).

DEAD SECTOR: Sets area (up to 2) where no radar pulses will be transmitted. For example, set the area where an interfering object at the rear of the scanner would produce a dead sector (area where no echoes appear) on the display. To enter an area, select ON and enter relative bearing range of the area.

INITIAL SETTING 3 menu

TRAIL RESTART: Selects whether to restart or discontinue echo trailing when changing the range. ON restarts trailing on newly selected range; OFF discontinues trailing.

ECHO AVG W/O GYRO: Echo averaging can be turned on without gyrocompass connection.

CURSOR GYRO SCALE: Bearing scale may be shown in degrees or compass points.

CTR ECHO STRETCH: Turn on to enlarge echoes in the range up to the first range ring.

VIDEO CONTRAST: For factory use. Do not change setting.

MAXIMUM RANGE: For factory use. Do not change setting.

ECHO FULL COLOR: Echoes may be displayed in single or multi-color.

INDEX LINES: Selects the number of index lines to display; 2 or 6.

INITIAL SETTING 4 menu

MODEL: Select radar model. Pulsewidth, pulse repetition rate and STC curve change according to selection.

RJ-5, RJ-7 and RJ-8: Selects which Interswitch unit to use.

ANT A: Select model of antenna A.

ANT B: Select model of antenna B.

CABLE L: Set for "500."

FACTORY SETTING: Restores all menus' default settings.

After entering initial settings

Turn off the #4 segment of DIP Switch S1 on the SPU Board to disable the menus for initialization and adjustment.

3.9 Setting the Function Keys

This radar has four function keys which automatically set up the radar according to the conditions ascribed to them. Confer with ship owner and radar operator to determine suitable program for each key.

Assign task to each function key;

Function key #1: picture setup
Function key #2 and #3: picture setup or specific operation
Function keys #4: specific or watch function

The table below and menu on the next page show the programs available.

Table 3-1 Operation setup conditions

Picture setup	Function
RIVER	River navigation
BUOY	Detecting navigation buoys, small vessels and other small surface objects
SHIP	Detecting vessels
SHORT	Short range detection using a range of 3 nm or less on calm seas.
LONG	Long range detection using a range of 6 nm or larger
CRUISING	Cruising using a range of 1.5 nm or larger
HARBOR	Short range navigation in a harbor using range of 1.5 nm or less
COAST	Coastal navigation using range of 12 nm or less
OCEAN	Transoceanic voyage using range of 12 nm or larger
ROUGH SEA	Optimum setting for rough weather or heavy rain

[FUNCTION KEY 1]

1	[SYSTEM SETTING 1]	
2	FUNCTION	FUNC1/RIVER/BUOY/ SHIP/SHORT/LONG/ CRUISING/HARBOR/ COAST/OCEAN/ ROUGH SEA (FLOAT/BIRD) *1
3	INT REJECT	OFF/1/2/3
4	PREVIOUS PAGE	
5	ECHO STRETCH	OFF/1/2
6	ECHO AVERAGE	OFF/1/2/3
7	A/C AUTO	OFF/ON
8	[FUNC1 PULSE WD]	(see menu below)
9	NOISE REJ	OFF/ON

[FUNCTION KEY 2] *2

1	[SYSTEM SETTING 1]	
2	FUNC KEY2	PICTURE/OPERATION
3	OPERATION	CU, TM RESET/ OFF CENTER/ ECHO STRETCH1/ ECHO STRETCH2/ PLS WD1/PLS WD2/ ECHO AVG1/ECHO AVG2/ ECHO AVG3/ECHO COLOR/TRAIL BRILL/ PANEL BRILL/CHAR BRILL/TM AUTO RESET/NOISE REJ

[FUNC1 PULSE WD] *3

1	[FUNCTION KEY 1]	
2	0.5	S1/S2
3	0.75	S1/S2
4	1.5	S1/S2/M1
5	3	S2/M1/M2
6	6	M1/M2/L
7	12-24	M2/L

[FUNCTION KEY 4]

1	[SYSTEM SETTING 1]	
2	FUNC KEY4	OPERATION/WATCH ALARM
3	WATCH ALARM INTERVAL	6/10/12/15/20 MIN

Notes

*1: Available on "R" specification radar.
*2: Same menu appears for function key 3.
*3: Same menu appears for function keys 1, 2 & 3.

Shaded items are set at the factory; do not change their settings. See note on next page.

Figure 3-7 Function key menus

Procedure for setting function keys

Function key #1

1) Press [RADAR MENU].
2) Press [0].
3) Press [3] to select FUNCTION KEY 1.
4) Press [2] to select picture setup condition desired.
5) Press [8]. (See the note on the next page.)

Function key #2 & #3

1) Press [RADAR MENU].
2) Press [0].
3) Press [4] to select FUNCTION KEY 2.
4) Press [2] to select PICTURE or OPERATION.

5) Press [3] to select picture setup condition (or specific operation) desired.

6) Press [9]. (See the note below.)

Function key #4

1) Press [RADAR MENU].

2) Press [0].

3) Press [5] (FUNCTION KEY 3) or [6] (FUNCTION KEY 4).

4) Press [2] to select OPERATION or WATCH ALARM.

5) Press [3] to select picture setup condition (or watch alarm interval).

6) Press [9]. (See the note which follows.)

Note: Each picture setup condition is programmed with optimal settings for interference rejection, echo stretch, echo averaging, automatic clutter removal, pulsewidth, and noise rejection. Therefore, the settings for those items on the function key menus should not be changed; any adjustment may adversely affect the target detection ability of the radar. If change is absolutely necessary, consult with nearest FURUNO representative or dealer.

Attach label to function keys

After setting the function keys, attach appropriate label (supplied) to function keys.

3.10 Menus for Initialization and Adjustment

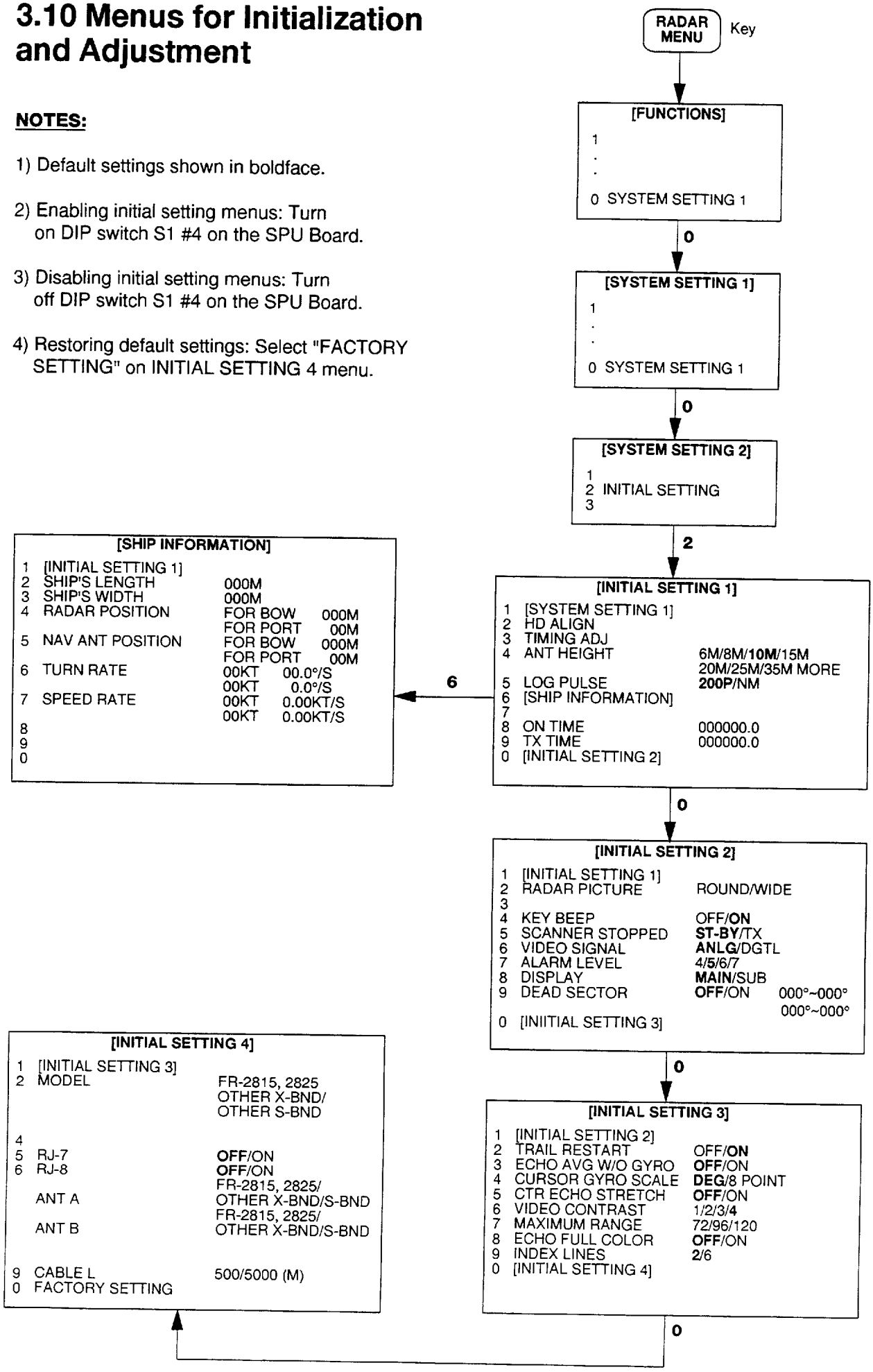
NOTES:

1) Default settings shown in boldface.

2) Enabling initial setting menus: Turn on DIP switch S1 #4 on the SPU Board.

3) Disabling initial setting menus: Turn off DIP switch S1 #4 on the SPU Board.

4) Restoring default settings: Select "FACTORY SETTING" on INITIAL SETTING 4 menu.



3.11 Installation Check List

Tick box to indicate completion.

- ❒ Hoist rings removed?
- ❒ Rubber mat placed between scanner unit and mounting platform?
- ❒ Waterproofing gasket on scanner unit oriented correctly?
- ❒ Heading aligned?
- ❒ Sweep timing adjusted?
- ❒ Main bang suppressed?
- ❒ Tuning checked?
- ❒ Magnetron heater voltage checked?
- ❒ Antenna height entered?
- ❒ Log pulse selected?
- ❒ GYRO CONVERTER Board set up?
- ❒ DIP Switch S1 #4 turned off?
- ❒ Function keys set and function key labels attached?
- ❒ Unused cable slots in cable clamp covered with aluminum tape?

4. INSTALLATION OF GYRO CONVERTER GC-8 (option)

The Gyro Converter GC-8, incorporated inside the radar display unit, converts analog gyrocompass reading into digital coded bearing data for display on the radar display.

This section explains how to install and setup the GC-8 (mainly consisting of the GYRO CONVERTER Board) and set it up according to gyrocompass connected.

4.1 General Procedure for Installing and Setting up the GYRO CONVERTER Board

1) Turn off the power.
2) Remove the top cover.
3) Connect the GYRO CONVERTER Board to the MOTHER Board (cables supplied with the GC-8) as follows:

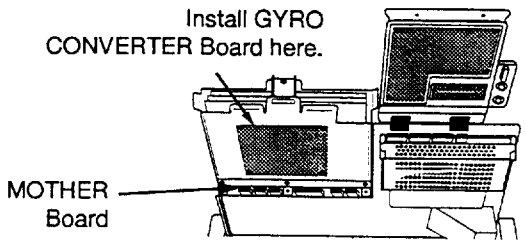


Table 4-1 Contents of GC-8-2 installation kit

Name	Type	Code No.	Qty
GYRO CONVERTER Board	64P1106	004-412-200	1
Washerhead Screw	M3x8	000-881-404	5
Label	64-014-2021-4	100-132-701	1

Figure 4-1 Display unit, top view

4) Connect the GYRO CONVERTER Board to the MOTHER Board (c ables supplied with GC-8) as follows:

GYRO CONV. Board		MOTHER Board
J1 (14P)	◄——►	J301 (6P)
J7 (5P)	◄——►	J307 (4P)

5) Confirm gyrocompass specifications and set up the DIP switches and jumper wires on the GYRO CONVERTER Board according to gyrocompass connected;

- Confirming gyrocompass specifications: see next page
- Setting jumper wires and DIP switches by gyrocompass specifications: page 4-4
- Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-6
- Location of jumper wires and DIP switches: page 4-7

6) Solder the gyrocompass cable to the VH connector assemblies (supplied).

7) Connect the VH connectors to the GYRO CONVERTER Board as shown in the table at right.

8) Attach instruction label (supplied) to the rear side of the top cover.

9) Close the panel.

10) Turn on and off the power to reset the CPU.

Connector		Gyrocompass	
		Step type	Synchro type
J4	#1	S1	S1
	#2	S2	S2
	#3	S3	S3
	#4		
	#5	F. G.	F. G.
J5	#1	—	R2
	#2	COM	R1
	#3	F. G.	F. G.

4.2 Connection of External Power Supply

Connect an external power supply when the repeater signal is step-by-step type and the step voltage is below 20V or output voltage is less than 5W.

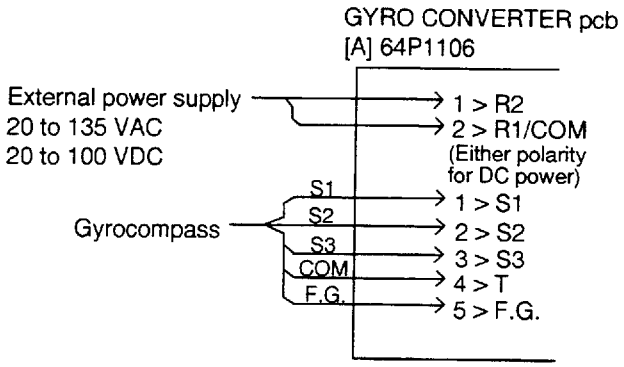


Figure 4-2 Connection of external power supply to GYRO GYRO CONVERTER Board

4.3 Confirming Gyrocompass Specifications

Follow the flow chart in the figure below to confirm gyrocompass specifications.

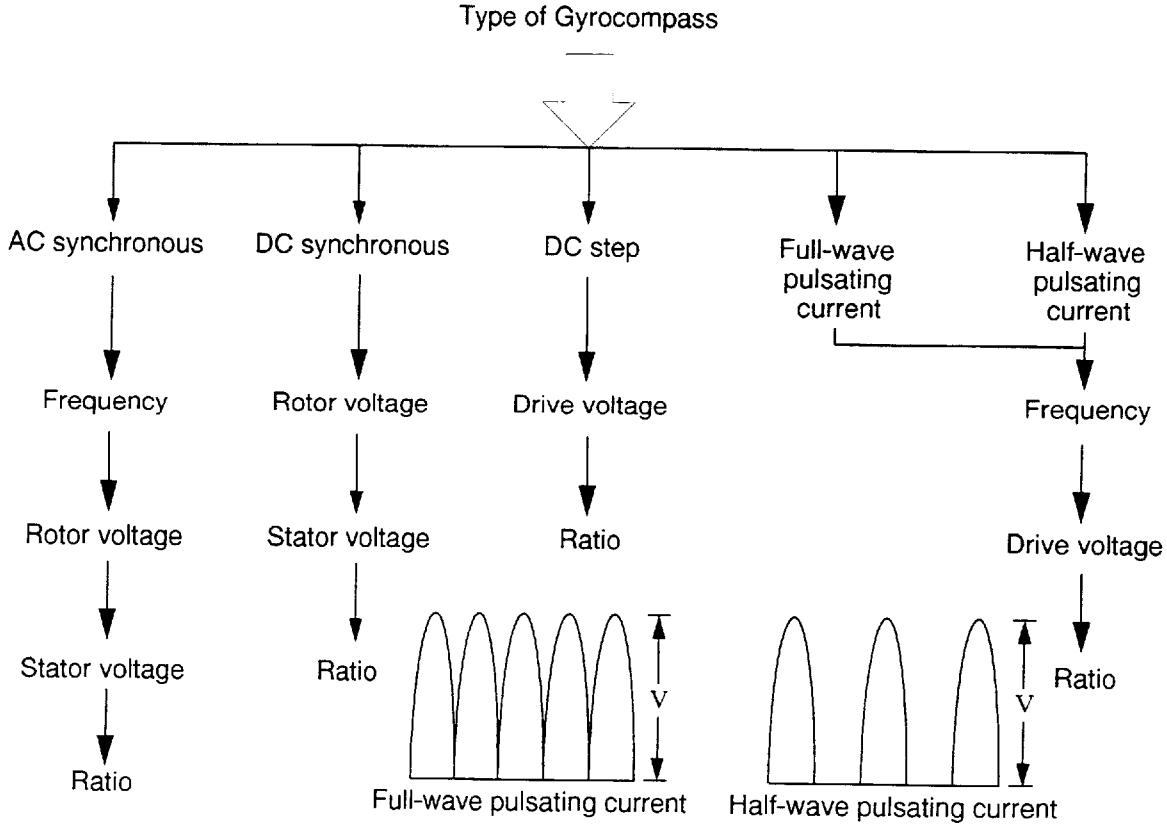


Figure 4-3 Confirming gyrocompass specifications

4.4 Changing Settings on the GYRO CONVERTER Board

Default setting

In the default setting all DIP switches are off and all jumpers wires are set to "#1." (Note that jumper wire JP1's setting is #1, #2, and #3.) In those settings the gyrocompass having the following specifications can be directly connected; modification of the GYRO CONVERTER Board is not necessary.

AC synchronous signal: 50/60Hz
Rotor voltage: 60V to 135V AC
Stator voltage: 60V to 135V AC
Gear ratio: 360x
Supply voltage: 30V to 135V AC

If the specifications of the gyrocompass differ from those mentioned above, change jumper wire and DIP switches settings on the GYRO CONVERTER Board. Settings may be changed according to gyrocompass specifications or make and model of gyrocompass (see page 4-6). For the location of DIP switches and jumper wires, see page 4-7.

Setting method 1: by gyrocompass specifications

1) Gyrocompass type

Gyrocompass type	SW 1-4	SW 1-5	SW 1-6	JP1
AC synchronous	OFF	OFF	OFF	#1, #2, #3
DC synchronous	OFF	OFF	OFF	#2, #3, #4
DC step	ON	OFF	OFF	#4, #5, #6
Full-wave pulsating current	OFF	ON	OFF	#4, #5, #6
Half-wave pulsating current	ON	ON	OFF	#4, #5, #6

2) Frequency

Frequency	SW 1-7	SW 1-8	Remarks
50/60Hz	OFF	OFF	AC synchronous pulsating current
400Hz	ON	OFF	AC synchronous pulsating current
500Hz	OFF	ON	AC synchronous pulsating current
DC	ON	ON	DC synchronous DC step

3) Rotor voltage (between R1 & R2)

Rotor voltage	SW 2-1	JP3
20V to 45V AC	ON	#2
30V to 70V AC	OFF	#2
40V to 90V AC	ON	#1
60V to 135V AC	OFF	#1

4) Stator voltage (between S1 and S2)

Stator voltage	SW 2-2	SW 2-3	JP2
20V to 45V AC, or 20V to 60V DC	ON	OFF	#2
20V to 45V AC, or 20V to 60V DC	OFF	OFF	#2
40V to 90V AC	ON	OFF	#1
60V to 135V AC	OFF	OFF	#1

5) Ratio

Ratio	SW1-1	SW 1-2	SW1-3
360x	OFF	OFF	OFF
180x	ON	OFF	OFF
90X	OFF	ON	OFF
36X	ON	ON	OFF

6) Supply voltage

Supply voltage	JP4	JP5
20V to 45V AC, or 20V to 60V DC	#2	#2
30V to 135V AC, or 40V to 100V DC	#1	#1

7) AD-10 format data Tx interval

Select data transmitting interval for ports 1 to 6 by jumper wires JP6 and JP7.

Note: The Tx interval is available in 25 msec or 200 msec. 25 msec is for radar; 200 msec is for all other equipment.

8) NMEA-0183 Tx interval

Tx interval	SW2-4
2 seconds	ON
1 second	OFF

Setting method 2: by make and model of gyrocompass

Table 4-2 Setting GYRO CONVERTER Board by make and model of gyrocompass

Maker	Models	Specification	SW 1-1	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	SW 2-1	SW 2-2	SW 2-3	JP1	JP2	JP3	JP4	JP5
FURUNO	GY-700	DC step 100V 180x 5-wire, open collector	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
Anschutz	Standard 2,3	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1
	Standard 4,6	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#1	#1	#1
	Standard 20	DC step 35V 180x COM(-) ,3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
Yokogawa Navtec (Plaith type)	C-1/1A/2/3 A-55, B-55	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1
	CMZ-250X/ 300X/500	DC synchronous 360x	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*
		DC step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
	CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	CMZ-50 Note	step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	Remo- ve	#2	–	*	*
Plaith	NAVGAT II/III	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#2	#1	#1
Tokimec (Sperry type)	ES-1/2/11 GLT-101/102/ 103/106K/107	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	MK-14 MOD-1/2/T NK-EN,NK-EI	DC step 70V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	SR-130/140	DC step 70V 180x 5-wire, open collector	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203	DC step 70V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	TG-6000	DC step 24V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	–	#2	#2
	GM-11	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	SR-120,ES-16 MK-10/20/30	DC step 35V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	#4, #5,#6	#2	–	#2	#2
Kawasaki	GX-81	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
Armabrown	MK-10,MKL-1 SERIES1351, MOD-4	DC step 50V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
Robertson	SKR-80	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	#4, #5,#6	#2	–	#2	#2

After changing settings

Turn on and off the power to reset the CPU.

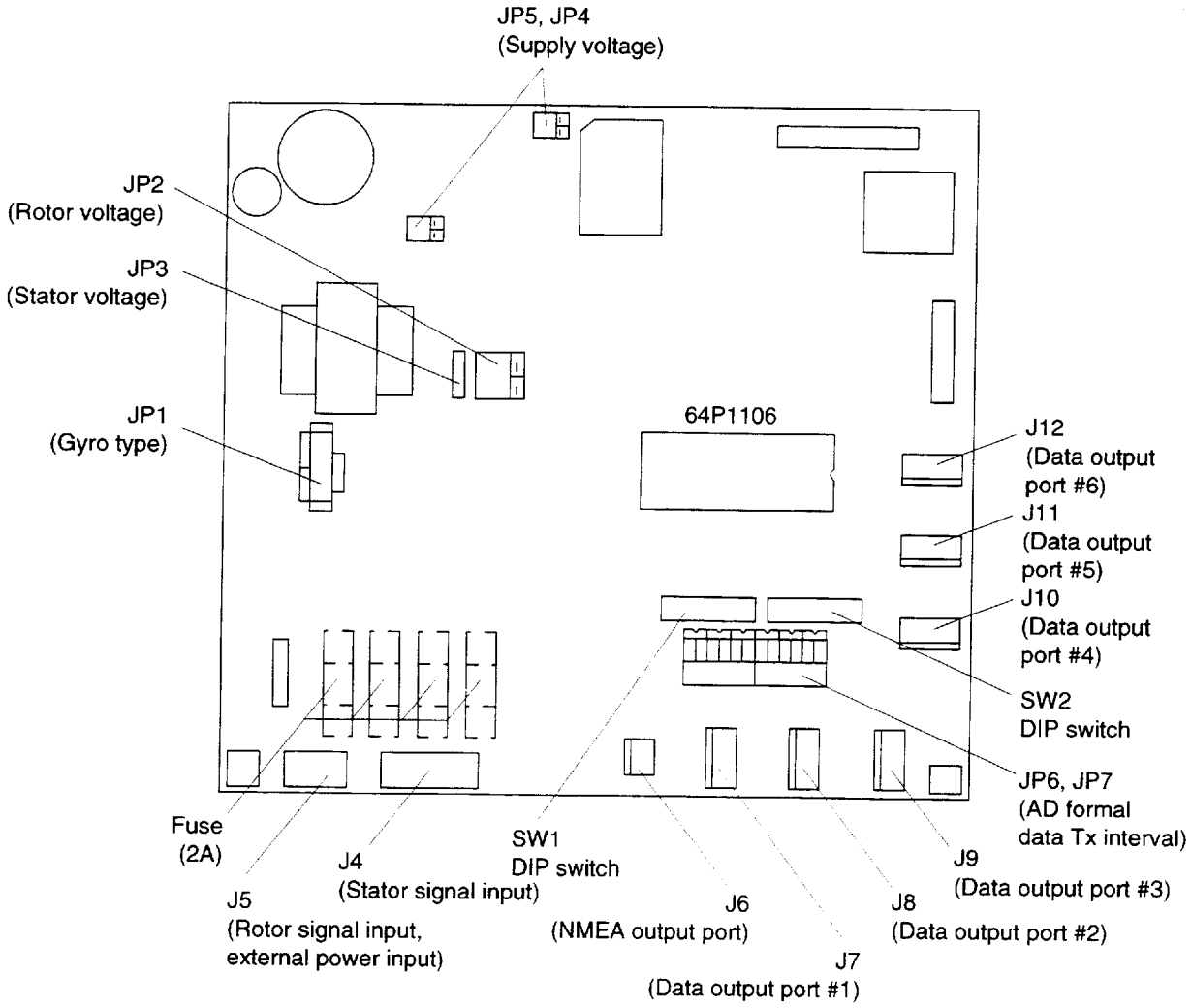


Figure 4-5 Location of DIP switches and jumper wires on the GYRO CONVERTER Board

4.5 Setting the Bearing on the Radar Display

Confirm that the gyrocompass is giving reliable readings. Then, set bearing on the radar display as shown in the procedure below.

1) Open the tuning compartment on the control panel. Press the HOLD switch to disengage the computing circuit from the gyrocompass. The "HOLD" LED lights.

2) Press [+] or [–] switch to duplicate the gyrocompass reading at the top of the radar display. (Each press of those switches changes the readout by 0.1 degrees. A switch may be pressed and held down more than two seconds to change the readout by one degree.)

3) Press the HOLD switch when the gyrocompass reading on the radar matches the gyrocompass reading. The "HOLD" LED goes off.

Note: In some cases, the gyrocompass rotation may be the opposite of the displayed bearing, in spite of correct connections. In this case try exchanging two connections among S1, S2 and S3 on the GYRO SWITCH Board.

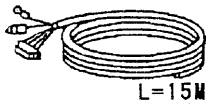
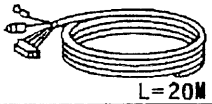
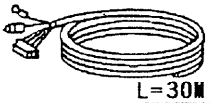
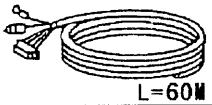
FURUNO

CODE NO.		03EU-X-9411 -2
TYPE		1/1

工事材料表

INSTALLATION MATERIALS

FR-2835S/FAR-2835S レーダー RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-56-15 RW-6895-0 *15M* CODE NO. 008-459-860	1	選択 TO BE SELECTED
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-56-20 RW-6895-0 *20M* CODE NO. 008-459-870	1	選択 TO BE SELECTED
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-56-30 RW-6895-0 *30M* CODE NO. 008-459-880	1	選択 TO BE SELECTED
4	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=60M	S03-56-60 RW-6895-0 *60M* CODE NO. 008-465-970	1	選択 TO BE SELECTED

DWG NO. C3407-M05- C

FURUNO ELECTRIC CO., LTD

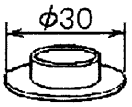
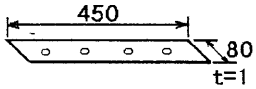
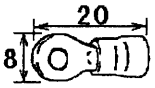
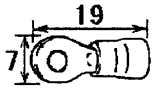
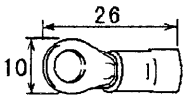
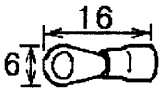
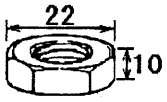
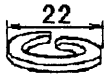
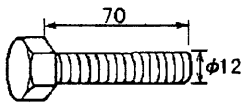
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-421-560	03EP-X-9431 -3
TYPE	CP03-14603	1/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	シールワッシャ SEAL WASHER		03-001-3002-0 CODE NO. 300-130-020	8	
2	防蝕ゴム CORROSION-PROOF RUBBER MAT		03-029-0301-2 CODE NO. 100-091-112	2	
3	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE NO. 000-538-114	18	
4	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	26	
5	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	
6	圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO. 000-116-634	1	
7	六角ﾅｯﾄ 1種 HEX.NUT		M12 SUS304 CODE NO. 000-863-112	16	
8	ﾐｶﾞｷ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	8	
9	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	8	
10	六角ﾎﾞﾙﾄ (全ﾈｼﾞ) HEX.BOLT		M12X70 SUS304 CODE NO. 000-807-825	8	

DWG NO.
C3387-M07- D

FURUNO ELECTRIC CO., LTD.

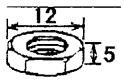
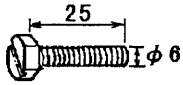
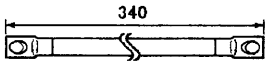
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-421-560	03EP-X-9431 -3
TYPE	CP03-14603	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ﾅｯﾄ 1種 HEX. NUT		M6 SUS304 CODE NO. 000-863-109	1	
12	ﾐｶﾞｷ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	
13	ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	
14	六角ﾎﾞﾙﾄ HEX. BOLT		M6X25 SUS304 CODE NO. 000-862-180	1	
15	ｱｰｽ線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	1	

DWG NO.
C3387-M08- D

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-461-760	03EU-X-9403 -2
TYPE	CP03-14602	1/2

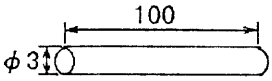
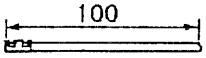
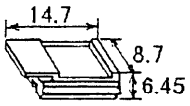
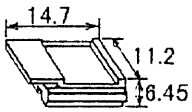
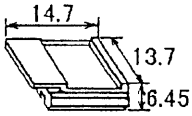
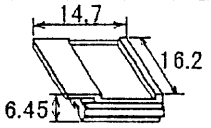
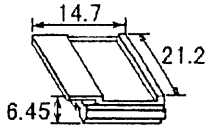
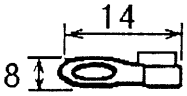
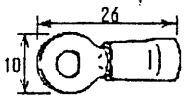
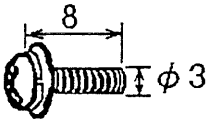
工事材料表

INSTALLATION MATERIALS

FR/FAR-2815/2825
2835S/2855/2855W
FA-2805

舶用レーダー

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	スミチューブ F(Z) HEAT-SHRINK TUBE		3X0.25 クロ *0.10M* CODE NO. 000-105-874	2	外部機器接続用 FOR EXTERNAL EQUIPMENT
2	NHコネクタ *センサイ* NH CONNECTOR ASSY.		AWG24 *0.1M* CODE NO. 000-132-342	20	外部機器接続用 FOR EXTERNAL EQUIPMENT
3	NHコネクタハウジング NH CONNECTOR HOUSING		H2P-SHF-AA CODE NO. 000-505-595	1	警報音信号(AC) EXT-BUZZER (AC)
4	NHコネクタハウジング NH CONNECTOR HOUSING		H3P-SHF-AA CODE NO. 000-505-596	2	ジャイロ信号用 GYRO DATA ログ信号用 SPEED LOG
5	NHコネクタハウジング NH CONNECTOR HOUSING		H4P-SHF-AA CODE NO. 000-505-597	3	RJ-8用 レーダブイ用 潮流計信号用
6	NHコネクタハウジング NH CONNECTOR HOUSING		H5P-SHF-AA CODE NO. 000-505-598	2	ジャイロ信号用 GYRO DATA ログ信号用 INSデータ用 INS DATA
7	NHコネクタハウジング NH CONNECTOR HOUSING		H7P-SHF-AA CODE NO. 000-505-600	1	舵角信号用 FOR PORT RUDDER
8	特殊ラグ LUG		アナケイ4 スズ CODE NO. 000-536-100	2	
9	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	
10	ナーナベセムスネジ B WASHER HEAD SCREW		M3X8 C2700 MBNI2 CODE NO. 000-881-404	2	

C3418-M03-D

FURUNO ELECTRIC CO., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-461-760	03EU-X-9403 -2
TYPE	CP03-14602	2/2

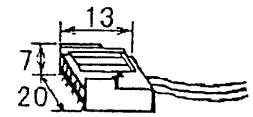
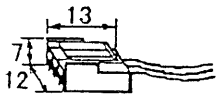
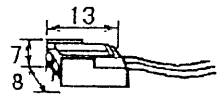
工事材料表

INSTALLATION MATERIALS

FR/FAR-2815/2825
2835S/2855/2855W
FA-2805

舶用レーダー

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	VHコネクタ組品 NH CONNECTOR ASSY.		03-1737(5P) CODE NO. 008-454-380	1	ジャイロコンバータ FOR GYRO CONVERTER
12	VHコネクタ組品 NH CONNECTOR ASSY.		03-1738(3P) CODE NO. 008-454-390	1	ジャイロコンバータ FOR GYRO CONVERTER
13	VHコネクタ組品 NH CONNECTOR ASSY.		03-1778(2P) CODE NO. 008-460-050	1	パフォーマンスモニター PM-30/50用 FOR PERFORMANCE MONITOR

C3418-M04-C

FURUNO ELECTRIC CO., LTD

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-452-540	03EP-X-9405 -4
TYPE	CP03-13907	1/1

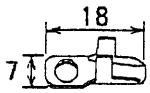
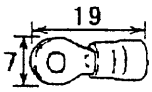
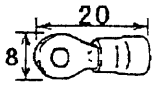
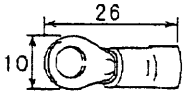
工事材料表

INSTALLATION MATERIALS

FR/FAR-2125W
FR-2135S/-B
FR-2135SW/-MSA
FR-2155/-B/2165DS
FR/FAR-2825W
FR/FAR-2835S/SW
FR/FAR-2855/W
FR/FAR-2865SW

船舶用ﾚｰﾀﾞｰ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	特殊ﾗｸﾞ LUG		ｱﾅｹｲ4 ｽｽﾞ CODE NO. 000-536-100	2	
2	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	16	
3	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE NO. 000-538-114	11	
4	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	19	

DWG NO.
C3387-M01- E

FURUNO ELECTRIC CO., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-459-930	03EU-X-9503 -3
TYPE	FP03-05703	1/1

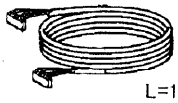
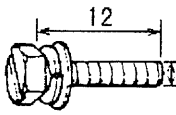
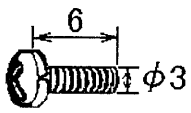
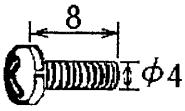
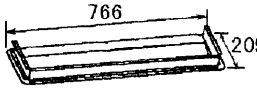
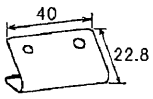
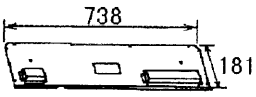
付属品表

ACCESSORIES

FR/FAR-2815/2825
2835S/2855/2855W
FR-2865SW/2825W
2835SW/FA-2805

船用レーダー

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	フラットケーブル組品 FLAT CABLE ASSY.		HIF6-50D-AA-1000 CODE NO. 000-136-783	1	
2	アブセットロッカクセムスB HEX. BOLT		M5X12 SUS304 CODE NO. 000-803-147	4	
3	トーナベセムスネジA WASHER HEAD SCREW		M3X6 C2700W MBNI2 CODE NO. 000-881-103	6	
4	トーナベセムスネジA WASHER HEAD SCREW		M4X8 C2700W MBNI2 CODE NO. 000-881-144	8	
5	操作部取付板 PANEL FIXING PLATE		03-133-1921-1 CODE NO. 100-233-491	1	
6	蓋保持板 SUPPORTING PLATE FOR LID		03-133-1613-4 CODE NO. 100-235-914	3	
7	底面板 BOTTOM PLATE		03-133-1922-1 CODE NO. 100-238-271	1	

C3418-F08- A

FURUNO ELECTRIC CO., LTD

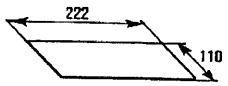
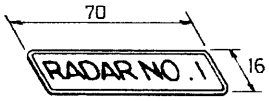
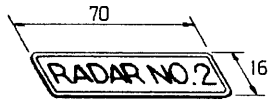
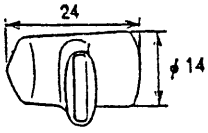
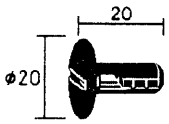
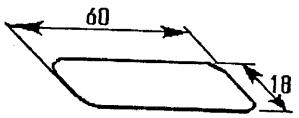
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-459-790	03EU-X-9502-4
TYPE	FP03-05701	

付属品表
ACCESSORIES

FR/FAR-2815/2825/2835S /2855/2855W /2865SW/2825W/2835SW MARINE RADAR
FA-2805 舶用レーダー

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ユーザーキーSWシート(E) KEY LABEL(E)		03-133-1802-1 CODE NO. 100-233-420	1	
2	システム銘板NO.1 NAME PLATE NO.1		03-009-0343-0 CODE NO. 300-903-430	2	
3	システム銘板NO.2 NAME PLATE NO.2		03-009-0344-0 CODE NO. 300-903-440	2	
4	端子板カバー PANEL BOARD COVER		ZM-47A CODE NO. 000-532-491	2	
5	ホールプラグ HOLE PLUG		NO. 4567 CODE NO. 000-800-729	4	
6	RPブラインドフィルム RP BRIND FILM		03-133-1636-0 CODE NO. 100-244-490	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

英文／操作パネル一体型
ENGLISH／PANEL FITTED

（略図の寸法は、参考値です。）

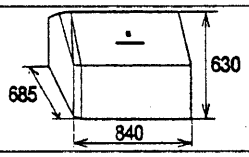
図番 (1/1)
DWG. NO. C3418-F02-F

FURUNO

CODE NO.	000-807-203	03EU-X-9504-2
TYPE	03-133-1811-0	

付属品表
ACCESSORIES

FR/FAR-2815/2825/2835S
/2855/2855W 舶用レーダー
/2865SW/2825W/2835SW MARINE RADAR
FA-2805

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾀﾞｽﾄｶﾊﾞｰ DUST COVER		03-133-1811 CODE NO. 000-807-203	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

（略図の寸法は参考値です。）

図番 (1/1)
DWG. NO. C3418-F04-E

FURUNO

CODE NO.	008-459-810	03EU-X-9505 -2
TYPE	FP03-05704	1/1

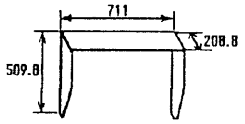
付属品表

ACCESSORIES

FR/FAR-2815/2825
2835S/2855/2855W
2865SW/2825W/2835SW
FA-2805

舶用ﾚｰﾀﾞｰ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ﾌｰﾄﾞ HOOD		03-133-1901-3 CODE NO. 100-233-443	1	

FURUNO ELECTRIC CO ., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

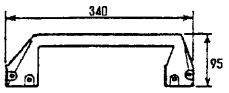
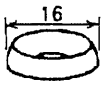
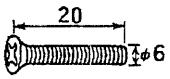
CODE NO.	008-475-740	03EU-X-9510 -2
TYPE	FP03-05705	1/1

付属品表

ACCESSORIES

FR/FAR-2815/2825
2835S/2855/2855W
2865SW/2825W/2835SW
FA-2805

レーダー
RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	取手 HANDLE		03-026-1203-2 CODE NO. 100-073-362	2	
2	ローゼット座金 ROSETTE WASHER		M6 C2700W ポリシール クロ CODE NO. 000-864-910	8	
3	+丸皿小ネジ OVAL COUNTERSUNK HEAD SCREW		M6X20 C2700W ポリシール クロ CODE NO. 000-861-475	8	
4	波座金 WAVE WASHER		WW-6 SUS CODE NO. 000-864-350	8	

DWG NO.
C3418-F06- B

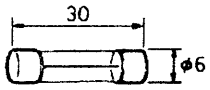
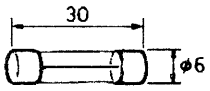
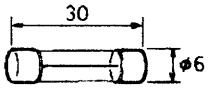
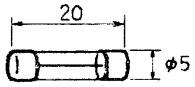
FURUNO ELECTRIC CO ., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-459-740	03EU-X-9301-3
TYPE	SP03-11301	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR/FAR-2815/2825/2835S/ FA-2805/2855/2855W/2865SW FR-2120W/2130W レーダー FR-2150W/2160SW RADAR		

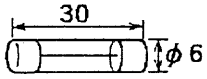
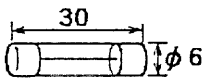
ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES.	QUANTITY SPARE	REMARKS/CODE NO.
1	管入りヒューズ GLASS TUBE FUSE		FGBO 0.5A AC250V	3		6	TCT9106 F3 000-549-018
2	管入りヒューズ GLASS TUBE FUSE		FGBO 5A AC250V	3		6	F1/F2/F3 (230V) 000-549-022
3	管入りヒューズ GLASS TUBE FUSE		FGBO 10A AC125V	2		4	F1/F2(100V) 000-549-065
4	ヒューズ FUSE		FGMB 2A AC250V	4		4	64P1106 000-122-000

MFR'S NAME	FURUNO ELECTRIC CO., LTD	DWG. NO.	C3418-P01-C	1/1

FURUNO

CODE NO.	008-452-700	03EP-X-9301 -3
TYPE	SP03-10320	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2155/2155-B 船舶用レーダー FR-2125W/2165DS FR-2135S/2135SW FR-2135S-B/2825W FR-2855/2855W MARINE RADAR FR-2865SW FR-2835S/2835SW	電源制御部用 FOR POWER CONTROL UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGBO-A 2A AC125V	1		2	000-549-062
2	ヒューズ FUSE		FGBO 10A AC125V	2		4	000-549-065

MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3387-P01- D	1/1

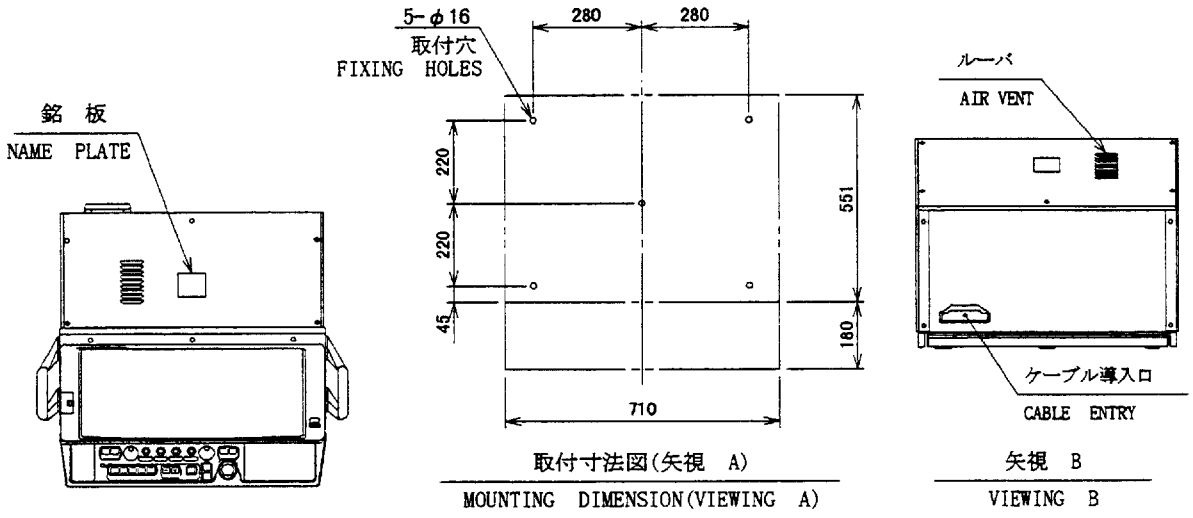
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED AT THE BACK OF THE UNIT SO THAT THE UNIT CAN BE DRAWN OUT WITH THE CABLES CONNECTED FOR MAINTENANCE.
2) USE M10 BOLTS OR φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICING CLEARANCE.

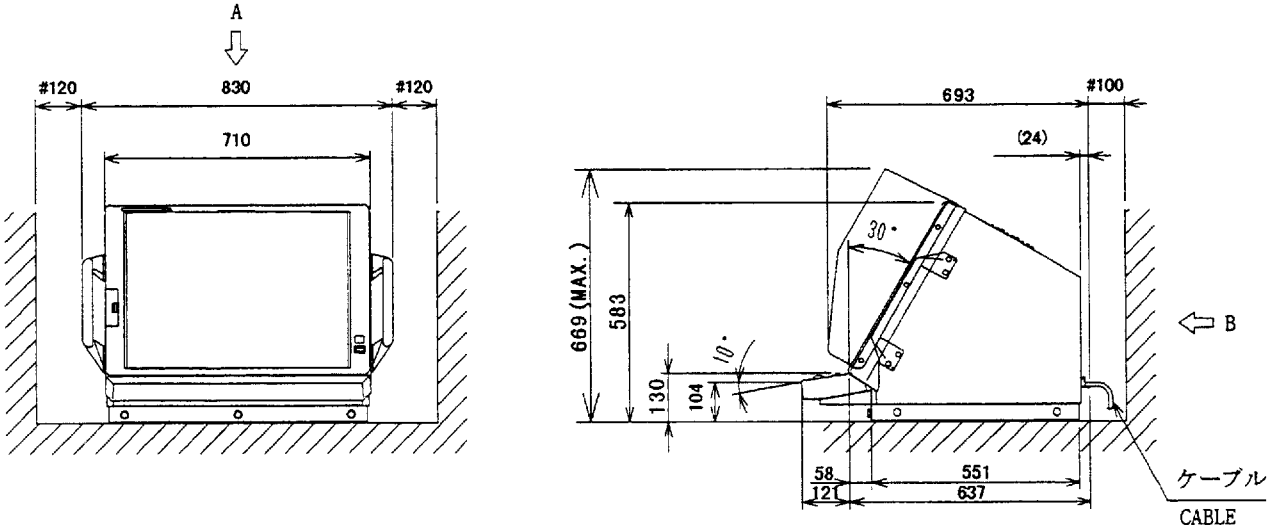
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０＜L≦１００	±２mm
１００＜L≦５００	±３mm
５００＜L≦１０００	±４mm
１０００＜L≦２０００	±５mm
２０００＜L≦４０００	±７mm
４０００＜L≦８０００	±１０mm
８０００＜L	±１５mm

表 1
TABLE 1



取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)

矢視 B
VIEWING B



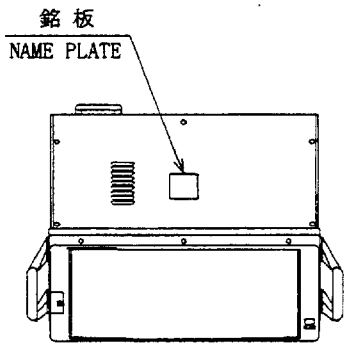
DRAWN Oct. 7 '97 T. YAMASAKI			TITLE RDP-115
CHECKED Oct 7 '97 K. Kusunoki			名称 指示器（卓上型）
APPROVED Oct 7 '97 K. Kusunoki	FR/FAR-2805 SER.		外寸図
SCALE 1/20	MASS 85 kg		NAME DIAPLAY UNIT (TABLETOP)
DWG. No. C3418-G02-C		03-133-1000-G2	OUTLINE DRAWING

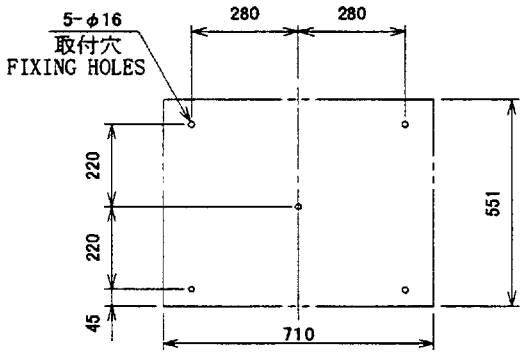
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう
余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED AT THE BACK OF THE UNIT SO THAT THE UNIT CAN BE DRAWN OUT WITH THE CABLES CONNECTED FOR MAINTENANCE.
2) USE M10 BOLTS OR φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICING CLEARANCE.

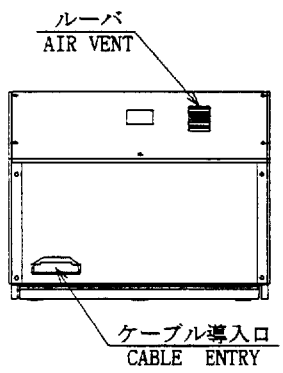
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

表 1
TABLE 1



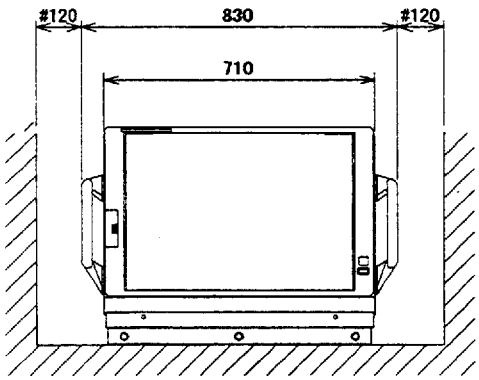


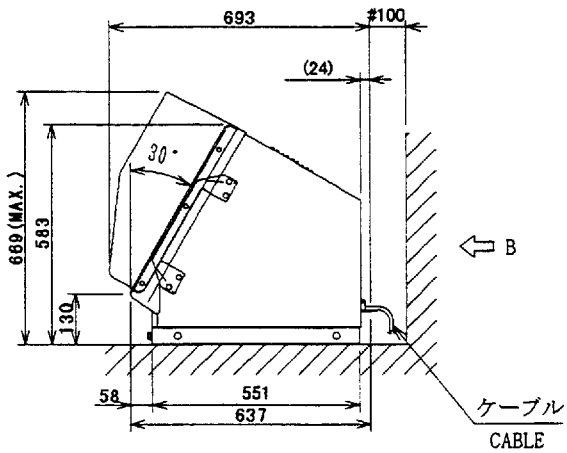
取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)



矢視 B
VIEWING B

A

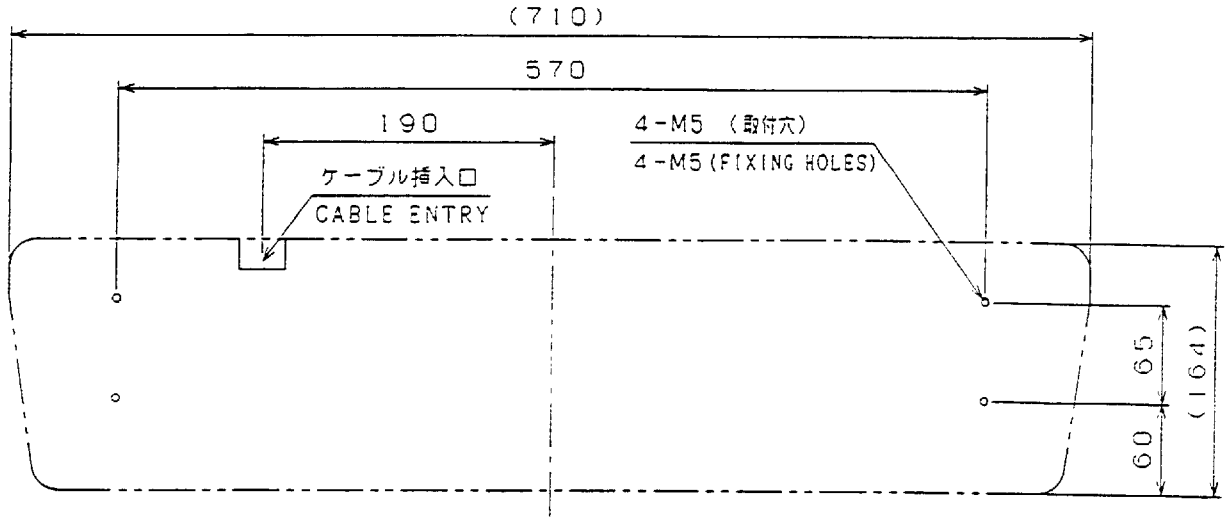




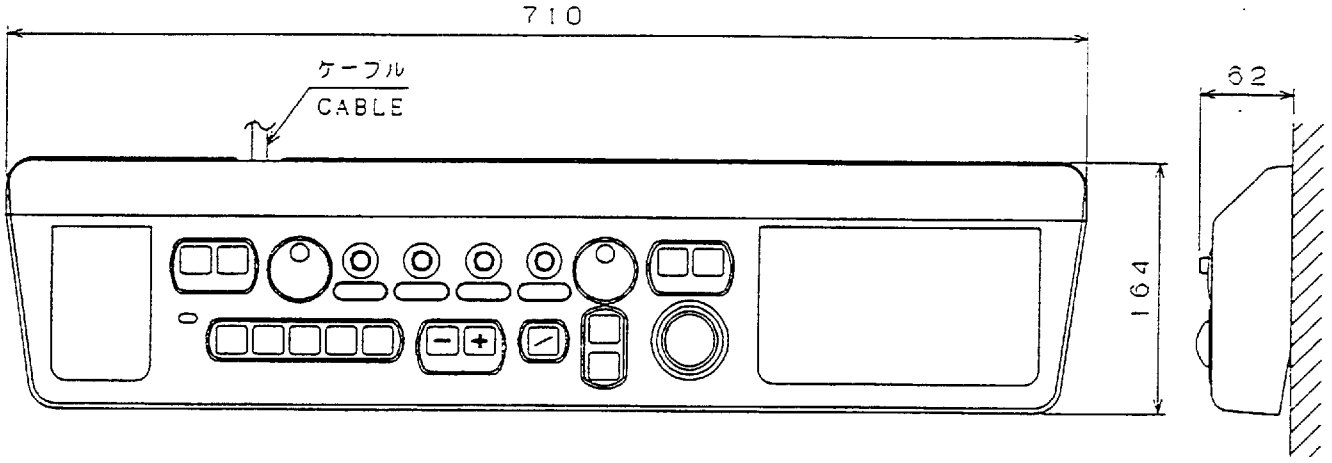
DRAWN Oct. 2 '97 T.TAMASAKI			TITLE RDP-115
CHECKED Oct 7 '97 K.Kusunoki			名称 指示器（卓上・パネル分離型）
APPROVED Oct 7 '97 K.Kusunoki		FR/FAR-2805 SER.	外寸図
SCALE 1/20	MASS 82 kg		NAME DIAPLAY UNIT (TABLETOP W/O KEYBOARD)
DWG. No. C3418-G01- C		03-133-1100-G2	OUTLINE DRAWING

FURUNO

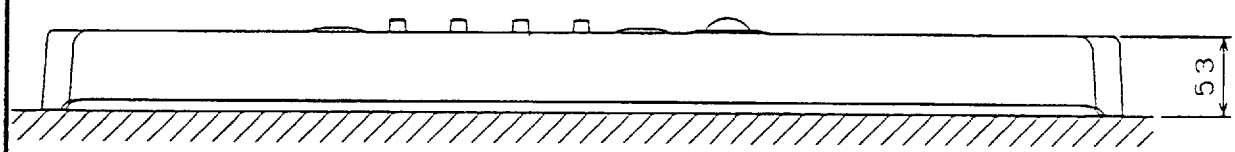
D - 3



取付寸法図（矢視A）
FLAT MOUNTING DIMENSION (VIEWING A)



A



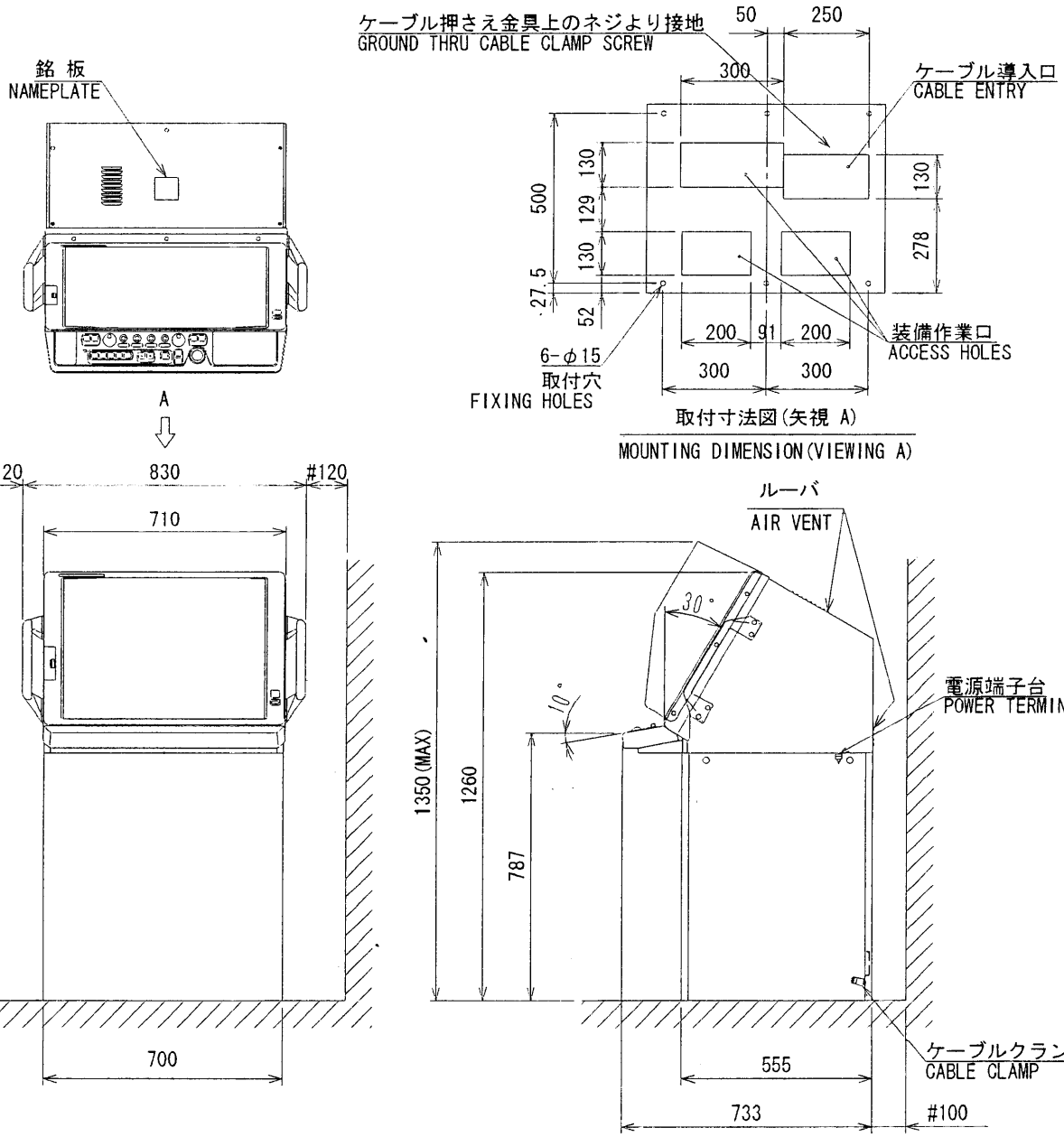
DRAWN July 6, 1995 Morimoto			TYPE RDP-115
CHECKED July 6, '95	FR2805SER FAR2805SE FA2805		名称 操作部外寸図
APPROVED July 6, '95 K.Okamoto			NAME CONTROL UNIT
SCALE 1/5 / MASS 3 kg	APPLICABLE TO: (MODEL)	BLOCK NO.	DWG NO. C3418-G04- A / 03-133-1600- 00

注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう
余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED
AT THE BACK OF THE UNIT SO THAT THE UNIT
CAN BE DRAWN OUT WITH THE CABLES CONNECTED
FOR MAINTENANCE.
2) USE M10 BOLTS OR φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICE CLEARANCE.

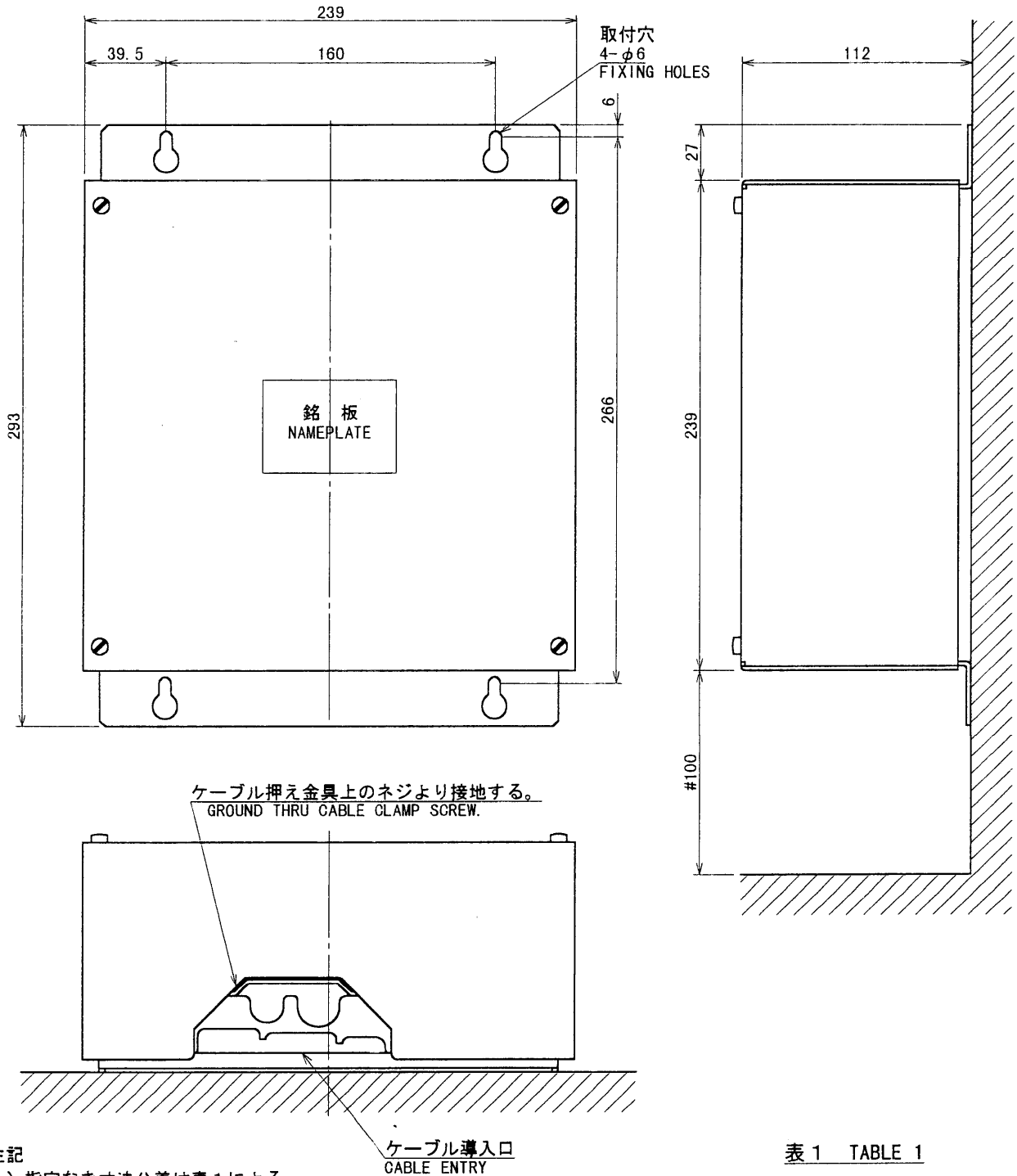
寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
0＜L≦50	±1．5
50＜L≦100	±2．5
100＜L≦500	±3
500＜L≦1000	±4
1000＜L≦2000	±5

表 1
TABLE 1



DRAWN July 27'00 T.YAMASAKI		TITLE	RDP-115
CHECKED July 27'00 T.K		名称	指示器（コンソール型）
APPROVED July 27'00 T.K	FR/FAR-2805 SERIES		外寸図
SCALE 1/20	MASS 120 kg ±10%	NAME	DIAPLAY UNIT (CONSOLE)
DWG. No. C3418-G03- H	03-133-1200-G1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



注記

1）指定なき寸法公差は表１による。
2）＃：推奨する最小サービス空間寸法。
3）取付ネジはトラスタッピンネジ呼び径５×20を使用のこと。

NOTE

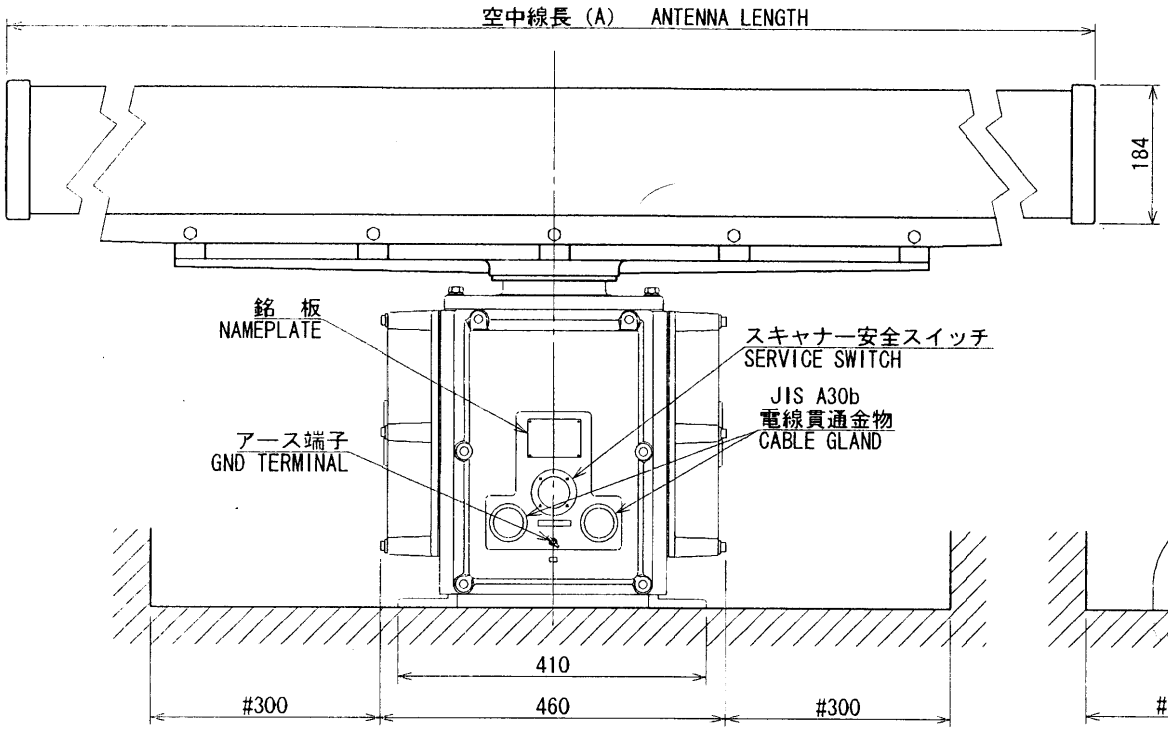
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. USE TAPPING SCREWS 5x20 FOR FIXING THE UNIT.

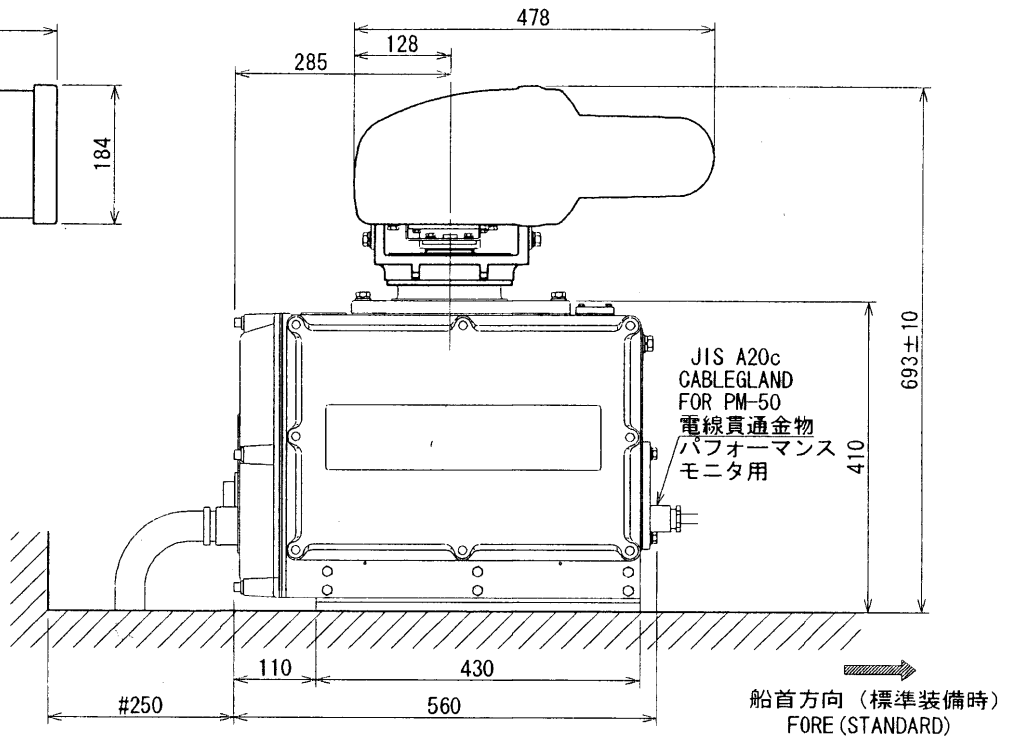
表１ TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 ＜ L ≦ 50	±1.5
50 ＜ L ≦ 100	±2.5
100 ＜ L ≦ 500	±3

DRAWN June 27 '00 T.YAMASAKI		TITLE	PSU-004
CHECKED June 27 '00 T. Kimura		名称	電源制御部
APPROVED June 27 '00 T. Kimura			外寸図
SCALE 1/4	MASS 2.3 kg ±10%	NAME	POWER SUPPLY UNIT
DWG. No. C3385-G02- D			OUTLINE DRAWING

FURUNO





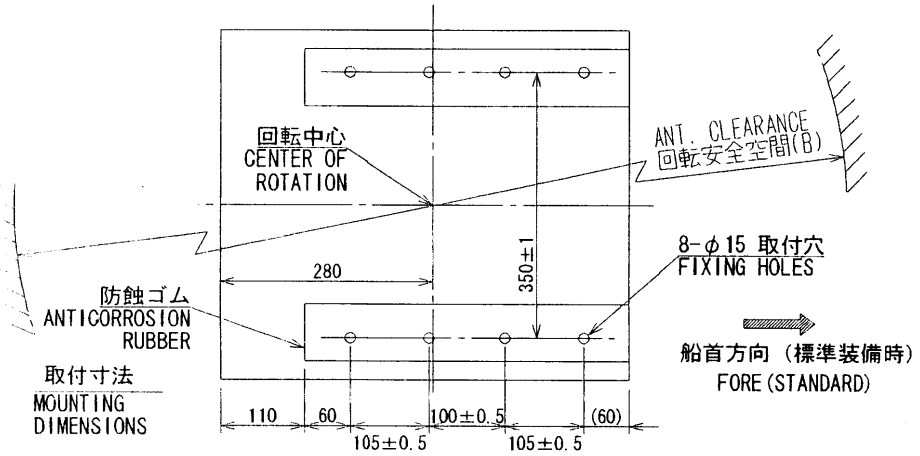


表 2 TABLE 2

種 類 ※※ ANT TYPE	SN36AF	SN30AF
空中線長(A) ANT LENGTH (mm)	3765±10	3090±10
回転安全空間(B) ANT CLEARANCE (mm)	3860	3200
質 量 MASS (kg)	133±10%	127±10%

※※レーダー型式により異なる。各仕様参照。
REFER TO SPECS. AS RADAR TYPE.

表 1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
0 < L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3
500 < L ≦ 1000	±4
1000 < L ≦ 2000	±5
2000 < L ≦ 4000	±7

注 記
1) #印寸法は最小サービス空間寸法とする。
2) 取付用ネジはM12ボルトを使用のこと。
3) 指定外の寸法公差は、表1による。

NOTE
1. #: RECOMMENDED SERVICE CLEARANCE.
2. USE M12 BOLTS FOR FIXING THE UNIT.
3. TABLE 1 INDICATES TOL. OF DIMENSIONS.

DRAWN Nov.28'00 T.YAMASAKI		TITLE	RSB-0026/0031-066
CHECKED Nov.28'00 K.K		名称	空中線部
APPROVED Nov.28'00 Y.K	FR/FAR-2835S FR-2135S		外寸図
SCALE 1/10	MASS 表2参照 SEE TABLE 2	NAME	SCANNER UNIT
DWG.No. C3469-G01- B	03-145-400G- 2		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

空中線部
ANTENNA UNIT RSB-0026/0031
RSB-0088/0089/0090 (FOR FAR-2835S HSC 45RPM)

RTB-801

STB-1
1 SPARE
2 SPARE
3 GND
4 MOTOR SW
5 SPARE
6 +12V
7 MOTOR 3φ (U)
8 MOTOR 3φ (V)
9 MOTOR 3φ (W)
10
11 水蒸防止 DE-ICER
12 100VAC
13 100VAC
14 NC

*OPYCY-1.5

GND
RW-4747

パフォーマンスモニター
PERFORMANCE MONITOR
PM-50
220/230VAC
200VAC
110/115VAC
100VAC
1 2 3 4 5 6
COM 100V 110/115V 200V 220/230V
電源毎にジャンパー変更
CHANGE JUMPER WIRE CONNECTION

*MPYCY-12

*MPYC(Y)-4

RW-6895 (25C-2C2V), 15/20/30m, φ23, MAX. 30m

チャ BRN
ダイ ORG
キス [B]YEL
アオス [B]BLU
シロス [B]WHT
(モモ) (PNK)
ミドリス GRN
ウスムラサキス [B]L-GRN
(ムラサキ) PPL
アカス [B]RED
クロス BLK
ドウジク 2C-2V COAX
シロ WHT
キ YEL

(チャ) (BRN)
(アカ) (RED)
(ダイ) (ORG)
(キ) (YEL)
(ウスミドリ) (L-GRN)
(アオ) (BLU)
(ムラサキ) (PPL)
モモ PNK

DJI(INT)
SPARE>1
R.MONITOR(DJ.MONITOR)>2
TUNING IND>3
TX TRIGGER>4
MBS-L>5
MBS-T>6
TUNE>7
MAG. CARR.>8
TP GND>9
(STC)>10
(TX-SIG)>11
PL-B>13
HEATER-C>15
+12V>16
+12V>17
PL-A>18
GND>19
GND>20
HEADING>21
BEARING>22
SPARE>23
SPARE>24
SPARE>25
SPARE>26
SPARE>27
>28

RDP-115/115A
指示部
DISPLAY UNIT

J441(INT)
IF IN>1
IF GND>2

J105(PCT)
PM OUT-H>1
PM OUT-C>2

DTB-2
TX-HV 1
MOTOR SW 2
SPARE 3
HD 4
BP 5
+12V 6
ANT.1 7
GND 8

J456(INT)
SPARE>1
SPARE>2
SCANNER SEL>3
GND>4

*MPYC-12
RJ-8
インタースイッチ
INTERSWITCH

*MPYC-7
ジャイロコンパス
GYROCOMPASS
R1(COM)
R2(NO)
S1(S1)
S2(S2)
S3(S3)

選択
SELECT

J5
R2(NO)>2
R1(COM)>3
J4
S1>1
S2>2
S3>3
NC>3
NC>4
NC>5
ジャイロコンバータ
(オプション)
GYRO CONVERTER (OPTION)
U4 A 64P1106 GC-8

CO-0.2x2P
J307(MB)
SHIFT1-C>1
SHIFT1-H>2
DATA1-C>3
DATA1-H>4
ADコンバータ
GYRO CONVERTER

CO-0.2x2P
J448(INT)
LOG-H>1
LOG-C>2
NC>3
スピードログ
SPEED LOG

RW-4864-φ9.5
J444(INT)
GND>1
ARPA HD>2
GND>3
ARPA BP>4
GND>5
ARPA TRIG>6
GND>7
ARPA VIDEO>8
外部ARPA
EXT ARPA

RW-4864-φ9.5
J442(INT)
GND>1
OP HD-A>2
GND>3
OP BP-A>4
GND>5
OP TRIG-A>6
GND>7
OP VIDEO-A>8
副指示器
SLAVE DISPLAY

RW-4864-φ9.5
J443(INT)
GND>1
OP HD-B>2
GND>3
OP BP-B>4
GND>5
OP TRIG-B>6
GND>7
OP VIDEO-B>8
副指示器
SLAVE DISPLAY

PTB-13
SPARE 1
SPARE 2
+12V 3
ANT.1 4
GND 5
SPARE 6

PTB-14
HD 1
B.P. 2
GND 3
MOTOR SW 4
SPARE 5
+12V 6

XK-1
3φ (U) 4
3φ (V) 5
3φ (W) 6

電源制御部
POWER SUPPLY UNIT
PSU-004

PTB-11
1
2
3 100/110/115.220/230VAC
4 〃
5
6
7
8
9 100VAC,水蒸防止
10 100VAC,DE-ICER
NC

PTB-12
1 3φ (U)
2 3φ (V)
3 3φ (W)

*IV-8SQ.

FL 1
3 4
C
H

SELECT
選択

選択 SELECT

*IV-8SQ.

船内電源
SHIP'S MAINS

(指示部用)
FOR DISPLAY UNIT
220/230 VAC 1φ, 50/60Hz
100/110/115 VAC 1φ, 50/60Hz
440 VAC 1φ, 50/60Hz

(水蒸防止用) 100 VAC
(DE-ICER) 1φ, 50/60Hz

(空中線部用)
FOR ANTENNA UNIT
110/115/220 VAC 1φ, 50/60Hz
110 VAC, 3φ, 60Hz
220 VAC, 3φ, 50Hz
440 VAC, 3φ, 50/60Hz
200 VAC, 3φ, 50/60Hz
220 VAC, 3φ, 60Hz
380 VAC, 3φ, 50/60Hz
440 VAC, 3φ, 60Hz

FOR FAR-2835S HSC (高速回転用)
220 VAC, 3φ, 50Hz
220 VAC, 3φ, 60Hz
440 VAC, 3φ, 60Hz

RU-1803
RU-3305
RU-5693
RU-6522
RU-5466-1

*OPYC(Y)-4
*OPYC(Y)-1.5
*TPYC(Y)-4

インタースイッチ RJ-7
RW-9200-2/10/20m, φ15

外部レーダー EXT RADAR SIG IN
RW-4864-φ9.5

VTR または リモートディスプレイ VTR or REMOTE DISPLAY
J449(INT)
1 V-SYNC
2 GND
3 H-SYNC
4 GND
5 CRT VIDEO-R
6 GND
7 CRT VIDEO-G
8 GND
9 CRT VIDEO-B
10 GND

シリアルデータ SERIAL DATA 航法データ NAV.DATA
CO-0.2x2P CHANNEL 1
J450(INT)
1 NAV TX-H
2 NAV TX-C
3 NAV RX-H
4 NAV RX-C
5 GND

外部ブザー(DC) EXT. BUZZER(DC)
*OPYC-1.5
J451(INT)
1 +12V
2 GND
3 EXT BUZ

外部ブザー(AC) EXT. BUZZER(AC)
*OPYC-1.5
J452(INT)
1 EXT BUZ(AC)
2 GND

ARPAデータ ARPA DATA
CO-0.2x2P
J454(INT)
1 TXD2-H
2 TXD2-C
3 RXD2-H
4 RXD2-C
5 GND

シリアルデータ SERIAL DATA (INSデータ INS DATA)
CO-0.2x2P CHANNEL 2
J455(INT)
1 TXD3-H
2 TXD3-C
3 RXD3-H
4 RXD3-C
5 GND

コース入力・潮流計 COURSE/CURRENT DATA
CO-0.2x2P
J459(INT)
1 SHIFT2-C
2 SHIFT2-H
3 DATA2-C
4 DATA2-C

船速・潮流計 SHIP'S SPEED/CURRENT DATA
*OPYC(Y)-1.5
J460(INT)
1 LOG2-H
2 LOG2-C

ロット・ラダー ROT/RUDDER
J464(INT)
1 ROT
2 ROT-GND
3 ROT-ALARM
4 ROT-ALARM-GND
5 RUDDER
6 RUDDER-GND
7 SPARE

注記
1) *:造船所手配
2) ( ) 内のカラーコードは内側シールド内の線を示す。

NOTE
1. *:SHIPYARD SUPPLY
2. WIRE COLOR CODE ( ): INSIDE WIRES. [B]: BIG WIRES. L-: LIGHT COLOR.

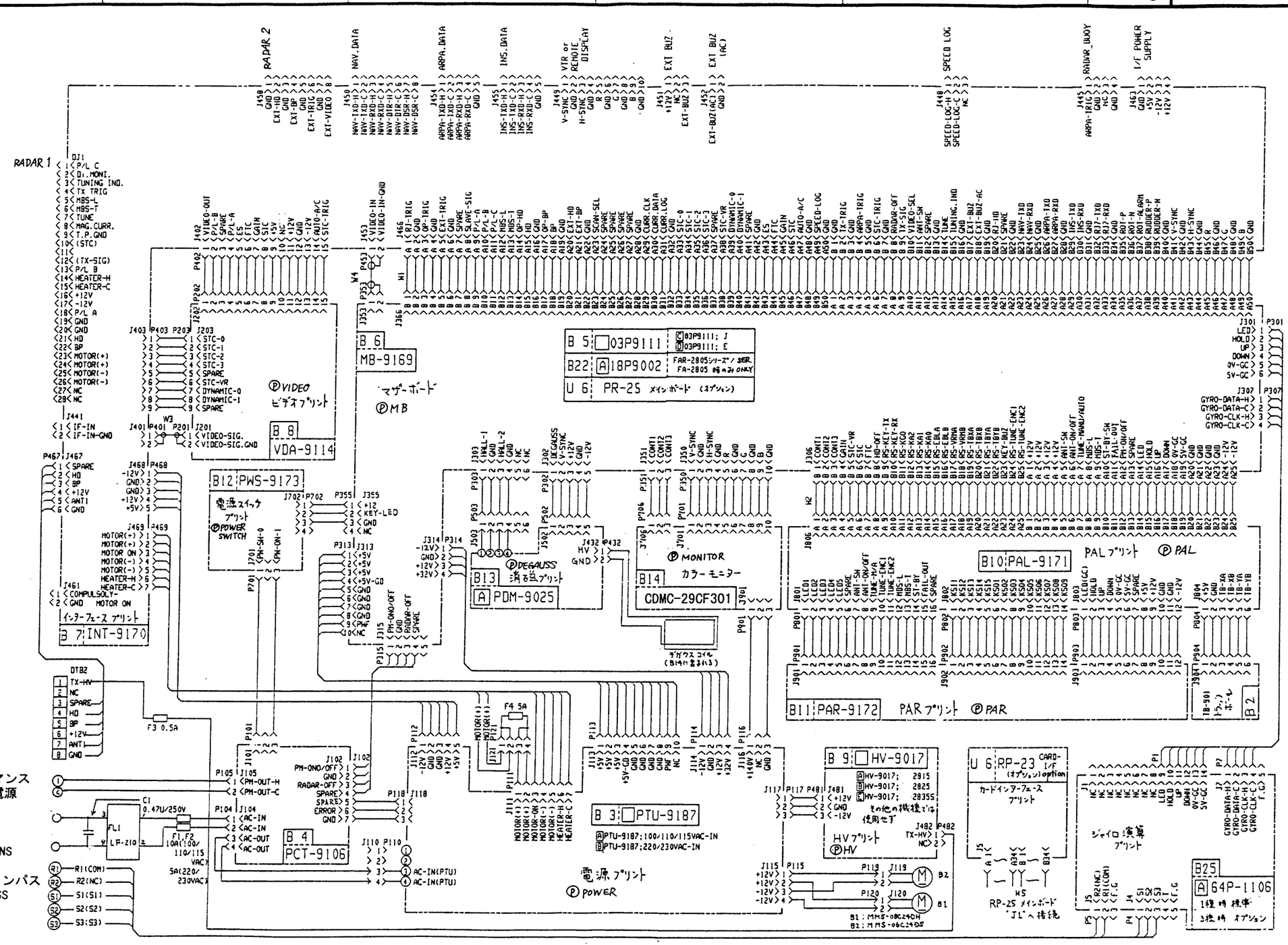
CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5
CO-0.2x5P: CO-SPEVV-SB-C 0.2x5P, φ13.5
CO-0.2x10P: CO-SPEVV-SB-C 0.2x10P, φ16.5

DRAWN	Sep/14'00 T.YAMASAKI	TYPE	FR/FAR-2835S
CHECKED	Sep/14'00 Y.Kimura	名称	船舶用レーダー／衝突予防援助レーダー
APPROVED	Sep/14'00 Y.Kimura		相互結線図
SCALE / MASS kg		NAME	MARINE RADAR / ARPA
DWG. No.	C3407-C03- E 03-130-6005-2		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO

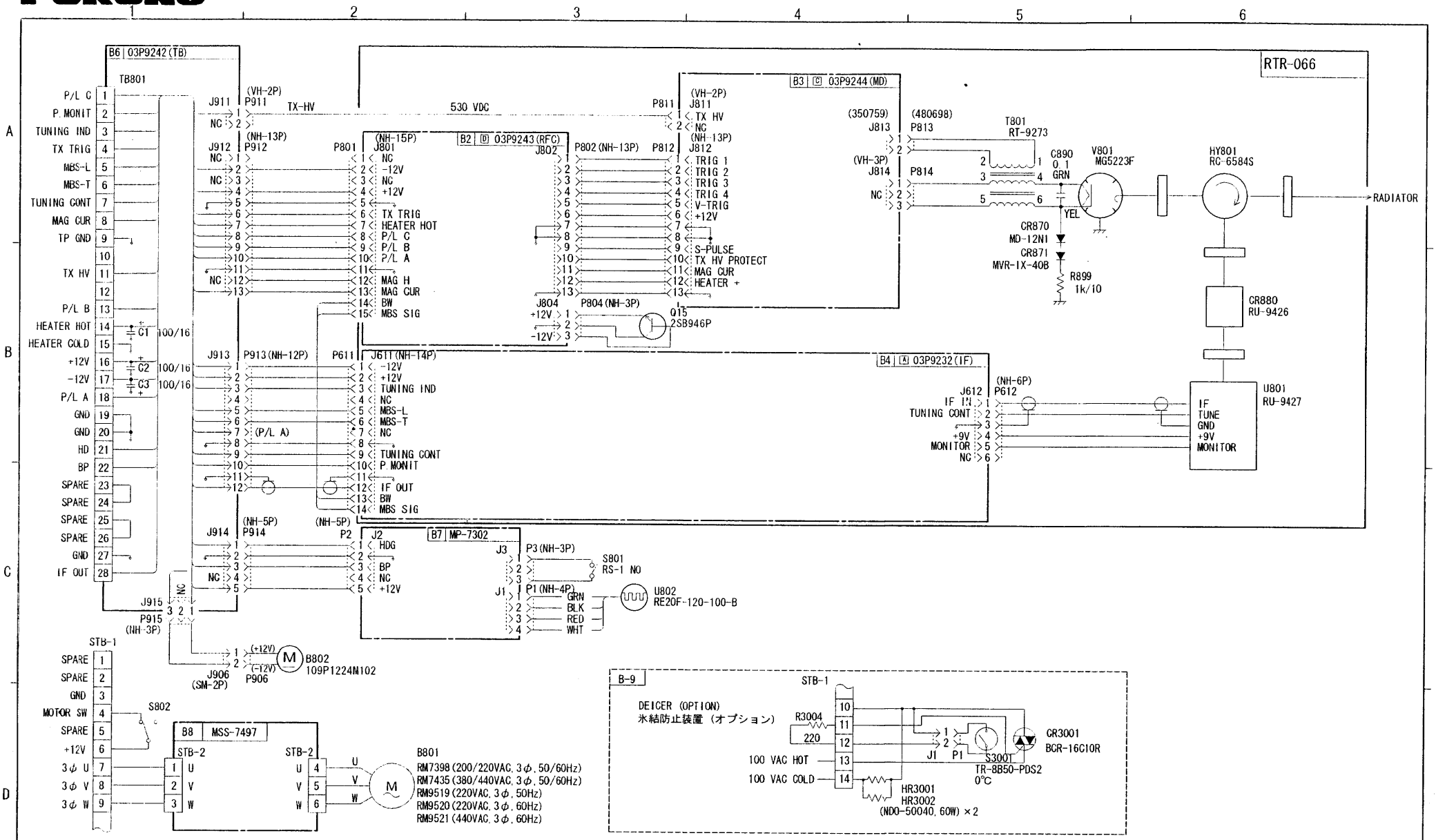
S - 2



DRAWN Dec/'98 T. Yamasaki			TYPE RDP-115/A
CHECKED Dec/'98 K. Kusunoki	SERIES FR-28X5 FAR-28X5		名称 指示部総合
APPROVED Dec/'98 K. Kusunoki			回路図
SCALE / MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME DISPLAY UNIT
DWG NO. C3404-K01- C	03-131-6002- 2		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO



NOTE

1. RSB-0026: 200 VAC, 3φ, 50 Hz OR 220 VAC, 3φ, 60 Hz
   RSB-0031: 380 VAC, 3φ, 50 Hz OR 440 VAC, 3φ, 60 Hz
   RSB-0088: 220 VAC, 3φ, 50 Hz
   RSB-0089: 220 VAC, 3φ, 60 Hz
   RSB-0090: 440 VAC, 3φ, 60 Hz

DRAWN Sep.5'00 Y.YAMASAKI		TYPE	RSB-0026/0031/0088/0089/0090
CHECKED Sep.5'00 Y.Kimura		名前	空中線部
APPROVED Sep.5'00 Y.Kimura	FR/FAR-2835S FR-2135S		回路図
SCALE MASS kg		NAME	ANTENNA UNIT
DWG No C3469-K01-C	03-144-6031-2		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO

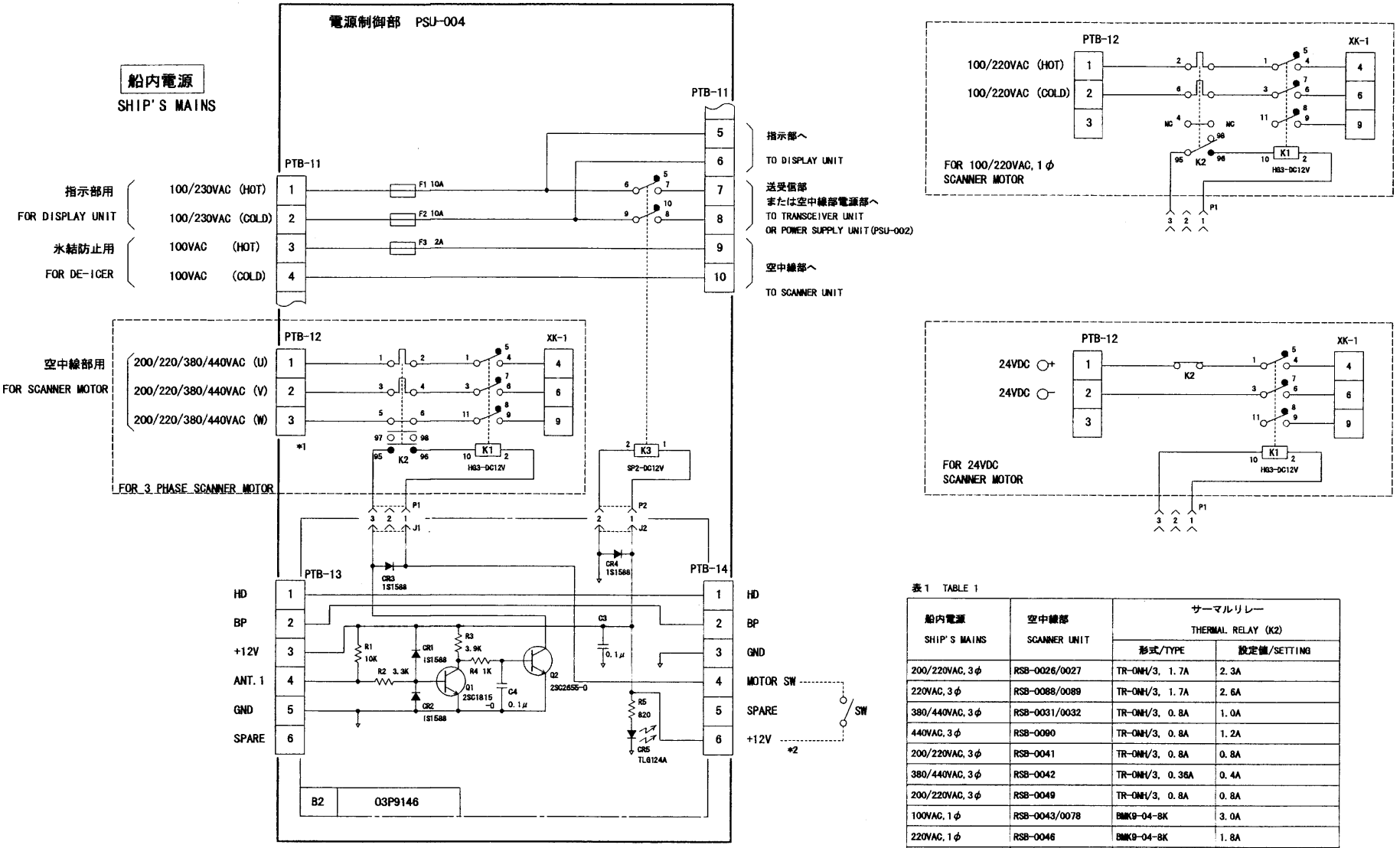


表1 TABLE 1

船内電源 SHIP'S MAINS	空中線部 SCANNER UNIT	サーマルリレー THERMAL RELAY (K2)	
		形式/TYPE	設定値/SETTING
200/220VAC, 3φ	RSB-0026/0027	TR-ONH/3, 1.7A	2.3A
220VAC, 3φ	RSB-0088/0089	TR-ONH/3, 1.7A	2.6A
380/440VAC, 3φ	RSB-0031/0032	TR-ONH/3, 0.8A	1.0A
440VAC, 3φ	RSB-0090	TR-ONH/3, 0.8A	1.2A
200/220VAC, 3φ	RSB-0041	TR-ONH/3, 0.8A	0.8A
380/440VAC, 3φ	RSB-0042	TR-ONH/3, 0.36A	0.4A
200/220VAC, 3φ	RSB-0049	TR-ONH/3, 0.8A	0.8A
100VAC, 1φ	RSB-0043/0078	BMK9-04-8K	3.0A
220VAC, 1φ	RSB-0046	BMK9-04-8K	1.8A
24VDC	RSB-0050	BAC101505D	5A(not adjustable)
	RSB-0051	BAC101505D	5A(not adjustable)

注記
＊1）設定値は表1を参照。
＊2）FR-2160DSのときはPTB-14の#4と#6を現地で短絡すること

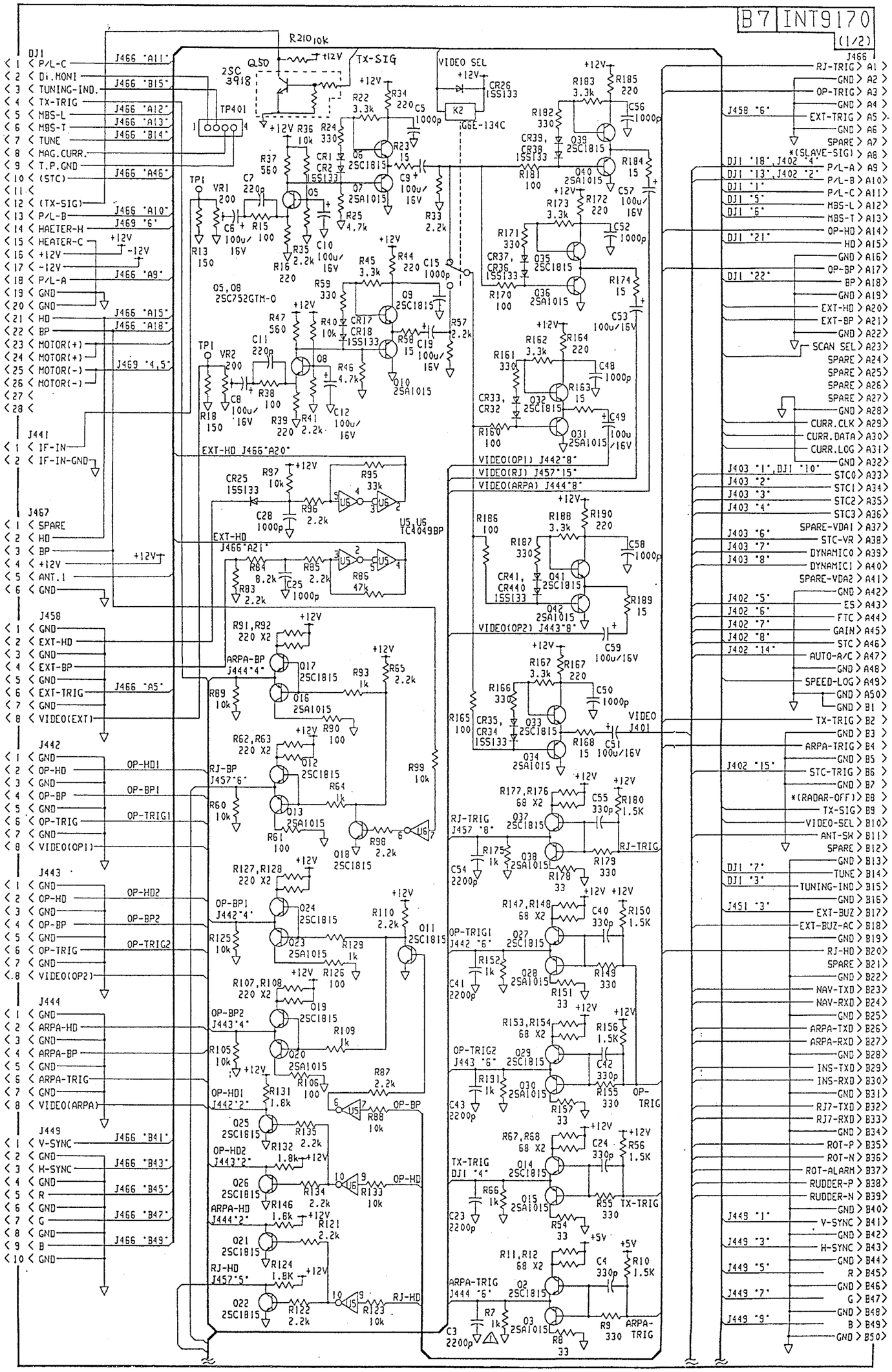
NOTE
*1. REFER TO TABLE 1 FOR THERMAL RELAY SETTINGS.
*2. FOR FR-2160DS, PUT A JUMPER BETWEEN #4 AND #6 OF PTB-14 AT INSTALLATION.

DRAWN Jun. 20 '01 T. YAMASAKI			TITLE PSU-004
CHECKED June 21 '01			名称 電源制御部
APPROVED June 21 '01	FR-28**SERIES FR-21**SERIES		回路図
SCALE	MASS kg		NAME POWER SUPPLY UNIT
DWG No. C3385-K01- F			SCHEMATIC DIAGRAM

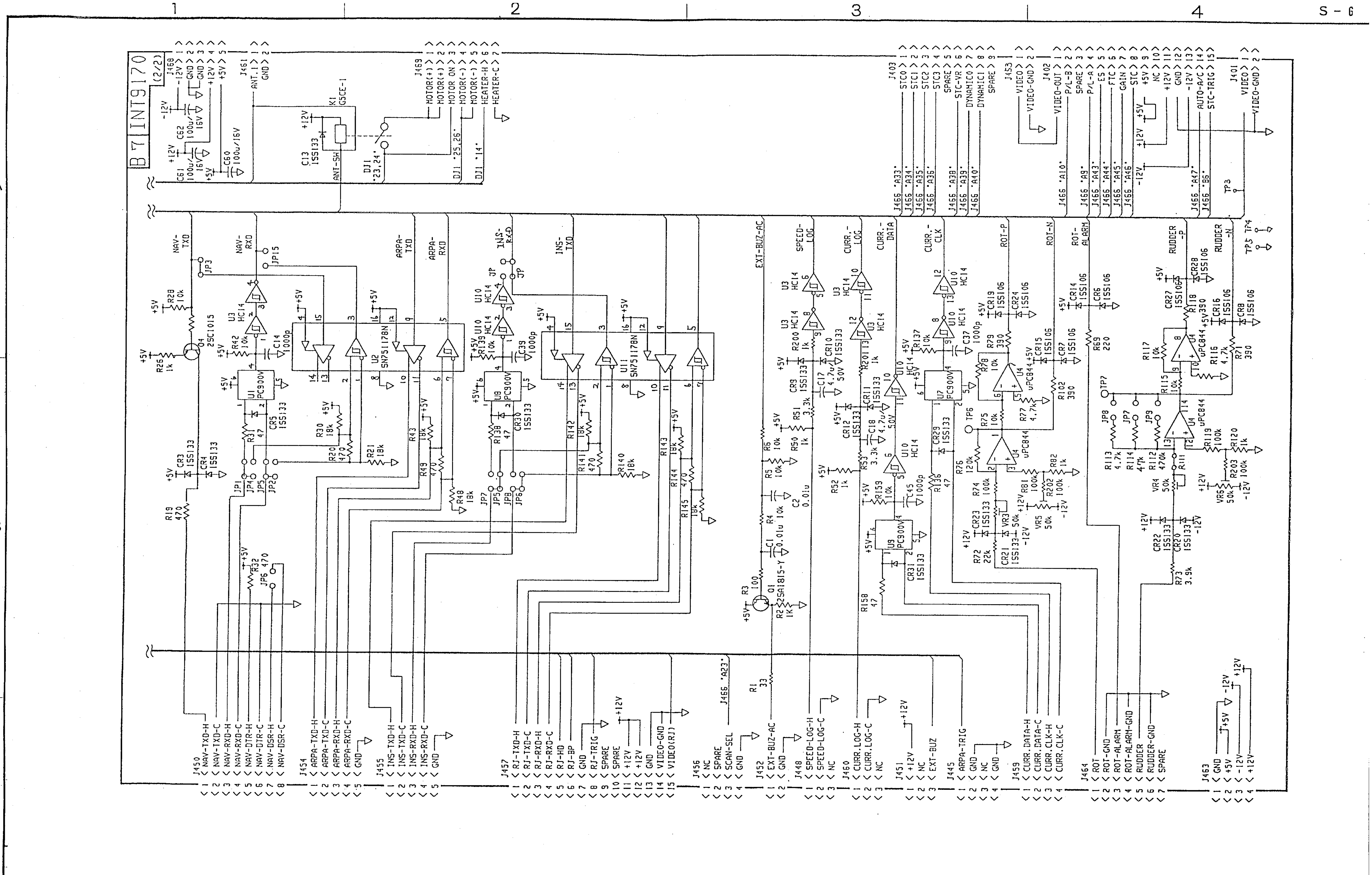
FURUNO ELECTRIC CO., LTD.

S-4

B7 INT9170 (1/2)



DRAWN	July. 18, 1995 Morimoto
CHECKED	July. 18, '95 Maki
APPROVED	July. 18, '95 Okamoto
SCALE	
MASS	
APPLICABLE TO:	FR2805SER FAR2805SE FA2805
BLOCK NO.	1B-7
TYPE	INT9170
名称	INT基板 (1/2)
NAME	INT BOARD (1/2)
DWG NO.	7A10-6001-1



DRAWN July 18, 1995 Morimoto			TYPE INT9170
CHECKED July 18, '95 Maki	FR2805SER		名称 INT基板 (2/2)
APPROVED July 18 '95 Okamoto	FAR2805SE FA2805	1B 7	NAME INT BOARD (2/2)
SCALE /	MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	DWG NO. C3418-K02- A 03-131-6004- 1